Zero

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Zero Inflation

The Goal of Price Stability

Richard G. Lipsey
editor

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Foreword

The monetary phenomenon of inflation creates distortions in the allocation of resources and inequities in the distribution of society's wealth. For example, as pensioners discover to their distress, an annual inflation rate of 5 percent halves the purchasing power of the dollar in just 14 years. So, even in the absence of any expenditures, people on fixed incomes would see their accumulated wealth in money terms erode significantly simply through the passage of time. What is also true is that, through changes in the money supply, the Bank of Canada can exert a powerful (but lagged) influence on the real economy, as the severity of the 1981–82 recession attests to.

In a series of publications over the past 15 years, the C.D. Howe Institute has been a key independent voice providing objective analysis of and informed commentary on Canadian monetary policy and the conduct of the Bank of Canada.

With *Zero Inflation: The Goal of Price Stability*, the Institute presents an explicit endorsement of Bank of Canada Governor John Crow's policy of zero inflation. The contributors to this pathbreaking study — five of Canada's most prominent macroeconomists — sympathize with those who are concerned about the costs of the current tightness in monetary policy. However, in the absence of an as yet unarticulated alternative goal, the authors strongly support moving to stable prices in the medium term. In practice, this means that the Bank should try to reduce the rate of increase of the Consumer Price Index to the 0–2 percent range and then hold it there.

There will be costs involved in going from the current 4–5 percent inflation rate to zero, costs relating to the tradeoff between inflation and unemployment and potential one-time losses in output as the lower level is approached. For this and other reasons, the contributors to the study recommend that the zero-inflation target be approached gradually, perhaps over a five-year period.

The Institute wishes to acknowledge Dick Lipsey's role in originating the idea for this project and in guiding it through to completion with the assistance of Robert C. York, Senior Policy Analyst at the Institute. The manuscript was prepared by Brenda Palmer; Barry A. Norris provided the editing and desktop publishing.

The Institute believes that this study will make a significant contribution to a more informed national debate on the activities of Canada's central bank, which profoundly affect all Canadians. As with all Institute publications, the analysis and conclusions presented here are the responsibility of the authors, and do not necessarily reflect the opinions of the Institute's members or Board of Directors.

Thomas E. Kierans
President

Preface

This volume owes its existence to the zero-inflation target that John Crow established shortly after he became Governor of the Bank of Canada in February 1987. In his first year as Governor, Mr. Crow gave a number of press conferences in which he mentioned price stability as a goal. These ideas were formalized in an address delivered at the University of Alberta in January 1988.[1]

Although I was aware of these developments, my own keen interest in the zero-inflation issue was aroused while listening to the Governor's address to the Canadian Economics Association in June 1988.[2] Governor Crow reiterated, in no uncertain terms, that his policy was to establish a zero-inflation rate in Canada within the foreseeable future. He also observed that:

> What has attracted more attention [in the Hansen Lecture] is the notion that general price stability could be a proper central objective for monetary policy to work towards and to maintain. A number of press commentators and some academic economists seem to find this a radical, perhaps even dangerous, notion. It drives them to strong, colourful language.[3]

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[1] John W. Crow, "The Work of Canadian Monetary Policy" (Eric J. Hanson Memorial Lecture delivered at the University of Alberta, Edmonton, Alberta, January 18, 1988. Reprinted in *Bank of Canada Review*, February 1988).

[2] John W. Crow, "Some Responsibilities and Concerns of the Bank of Canada" (Address by the Governor of the Bank of Canada at the annual meeting of the Canadian Economics Association, University of Windsor, Windsor, Ont., June 4, 1988. Reprinted in *Bank of Canada Review*, June 1988).

[3] Ibid., p. 5.

The Governor's speech aroused many questions in the minds of the economists in his audience, many of whom were led to think seriously for the first time about his increasingly strong commitment to the goal of zero inflation:

- Could he do it?
- Should he do it?
- Is a measured rate of zero the right number to head for?
- Can we get to zero, or thereabouts, at an acceptable cost?

What can economists contribute to the big debate that will be set off by his attempt to reach that goal through monetary policy, with the temporarily high levels for interest rates and for the Canadian dollar that will be required?

The debate over reducing the inflation rate toward zero was complicated in 1989 by the rate's tendency to creep up from the small range around 4 percent — where it had stayed for several years — into the 4½ to 5½ percent range. The Bank's policy then became, first, to return the inflation rate to 4 percent and, second, to reduce the rate further, toward zero. Critics of the Bank's current policy are often unclear about which of these two strategies they dislike. This is understandable enough — if you do not like what the Bank is doing, it may not seem important to worry about why it is doing it. Yet, it is impossible to evaluate such criticism unless one knows which of the Banks' objectives the critic thinks are misguided and what alternatives the critic would have the Bank pursue.

It is quite possible that the first job will have been accomplished by the time the reader opens these pages. The current inflation rate may have returned to the 4 percent range of the late 1980s. Interest rates may then moderate and the external value of the Canadian dollar may fall somewhat. Debate over monetary policy may then subside for a while. However, the policy of moving toward a zero-inflation rate will be with us for some time. Since it will require monetary tightness (relative to what would be required by a policy of accepting the current rate of inflation), controversy over the Bank's policy will be endemic for some years to come. Sometimes, when interest rates are falling, controversy will subside. Sometimes, when interest rates are rising, controversy will become heated once again. In spite of these cyclical fluctuations in intensity, the debate over the Bank's monetary policy will be an important one until either a zero rate of inflation is established or the Bank gives up on its zero-inflation policy. For this reason, the public policy issues discussed here will continue to be relevant throughout the 1990s.

This volume is dedicated to shedding some light on the questions listed above, and other related issues. In the introductory essay, I do a bit to put the debate about monetary policy into its political economy setting. In doing this, I refer to many issues that are considered in much more detail in subsequent essays.

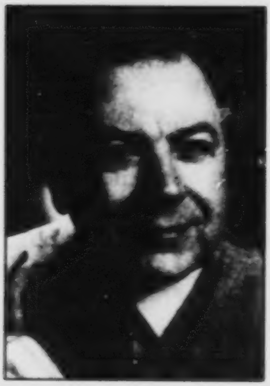
Douglas Purvis then lays out the broad consensus that exists among economists about the causes of inflation and the powers that monetary policy has, and does not have, to influence the price level. This leads him to consider the transition phase as monetary policy is used to lower any given rate of inflation.

Peter Howitt takes the longer view, and asks two key questions. What would be the most preferable inflation rate if we were setting up an economy with no past history? What is the appropriate long-term inflation target, given that we now have about a 5 percent inflation rate?

Pierre Fortin, in an admirably accessible essay, considers the technical questions: What is the best measure of inflation? What would that measure record when inflation really was zero? (If the speedometer in your car is biased, it may not read zero when the car is standing still; by the same token, our measure of inflation may not record zero when the price level "really" is stable.)

Finally, David Laidler provides a summary comment based on the wisdom he has developed over three decades of studying inflation and commenting on anti-inflation policies on both sides of the Atlantic.

Richard G. Lipsey
Simon Fraser University and
The Canadian Institute for Advanced Research
January 1990



The Political Economy of Inflation Control

Richard G. Lipsey

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This essay examines some of the political economy issues connected with the control of inflation. Whole books can be written on these matters, so one must be selective. First, I discuss the evolution of the view that government has a responsibility to operate a monetary policy, and to operate it so as to oil the wheels of commerce while not causing serious inflation. Then I discuss some of the main positions that can be identified in the opposition to the Bank of Canada's present monetary policy. Finally, I try to lay out the substantive issues in the ongoing debate over monetary policy, as distinct from the issues involving mere rhetoric or the jockeying for political advantage.

Historical Considerations

Inflation and the Early Economists

Inflation was one of the earliest issues addressed by economists. Many centuries ago, early economists saw that, when rulers debased a metallic currency by adding an increased amount of base metal to the coins, or by printing too much paper money, the extra demand created by the new money bid up prices. One of the earliest, and most enduring, relationships economists established was that changes in the quantity of money were positively associated with changes in the general level of all prices — the so-called "price level." While there have been debates about the exact nature of this relationship, and about the mechanism that links these two economic magnitudes, there has never been a successful challenge to economists' general understanding that:

Major increases in the quantity of money are associated with major increases in the price level, and major increases in the price level cannot be sustained without major increases in the quantity of money.[1]

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[1] Money has always been recognized to have several functions, the two most important of which are to act as a medium of exchange and as a unit of account. The quantity of money in the economy is often referred to as the *money stock* or the *money supply*. It consists of the total value of notes and coins in circulation (nowadays a relatively unimportant component) plus certain highly liquid financial assets. Because money is first and foremost a medium of exchange, the liquid assets included in the money supply were at one time limited to current account bank deposits, which were the only deposits subject to transfer by cheque. In more recent times, however, other financial assets transferable by cheque have been introduced — for example, daily interest chequing accounts, which, from a strictly legal viewpoint, are a form of savings deposit. Furthermore, there are many other assets, such as passbook savings accounts, that can easily be turned into money either by transferring them to chequing accounts or by using them as overdraft security. Today, we recognize the existence of a continuum of assets, starting with currency and chequable bank deposits, that may be ordered according to the ease with which they can be turned into media of exchange. When such a spectrum of assets exists, there is no single, unambiguous way of defining and measuring the supply of money; instead, there is a continuum of more or less substitutable monetary assets, and central banks worried about the amount of liquidity in the system are wise to monitor a range of monetary aggregates.

The quantity of money is determined by those who create it. In the early days of coinage, the money being used in any one market would likely have come from several sources, including the local government and many foreign states. After all, coins only provided a guarantee that a certain amount of precious metal was contained therein. Over time, with the rise of nation states, coinage increasingly became the responsibility of a country's national government. With the rise of paper money, central banks slowly evolved into the sole issuers of legal tender. The history of that evolution varies from country to country, but by the early part of the 20th century, the evolution was substantially complete.[2]

Thus, for several centuries the state has been understood to have some responsibility for the integrity of the nation's money. By the beginning of the 20th century, the regulation of the money supply — so as to provide enough liquidity to oil the wheels of commerce, but not so much as to cause major inflations — had become to be understood as a responsibility of most central banks. Since central banks were usually either owned by, or under the control of, national governments, then operating a monetary policy — regulating the terms and volume of credit, and hence the amount of money available to the economy — was accepted as a government responsibility long before anyone imagined that government had any responsibility to operate policies aimed at full employment or the economy's growth rate.

Skepticism about Monetary Policy

In the 1930s, a new issue called into question the efficacy of monetary policy. No one disputed that when the economy was at or near full employment, major increases in the quantity of money would lead to major increases in total demand for goods and services, which would, in turn, cause the price level to rise. For the first time in history, a group of economists, led by the great English economist John Maynard Keynes, provided the theoretical underpinnings for a government-operated, full-employment policy and said that government had a responsibility to influence the course of the business cycle. In particular, they argued, government could take actions to lower the level of unemployment when the economy was in a serious depression, as it then was.

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[2] Some i's still remained to be dotted and some t's to be crossed, such as the formal nationalization of the Bank of England in 1946.

For Keynesians, the preferred tool for accomplishing this important task was fiscal policy — in the form of deficit-financed increases in government expenditure. Keynesians also argued that, in the conditions ruling in the 1930s, monetary policy would be impotent. In particular, increases in the quantity of money — increases that the central bank could engineer — would not cause increases in the demand for goods and services sufficient to propel the economy back to full employment. Whether or not that proposition was right for the 1930s, it had little to do with the propositions concerning the effects of major increases in the quantity of money when the economy was at or near full employment.

The Revival of the Belief in Monetary Policy

The belief that monetary policy had been discredited as a means of achieving full employment starting from a position of severe depression led many to conclude, illogically, that monetary policy had little effect on the price level. It took Milton Friedman and his band of monetarists two decades of intense proselytizing to persuade Keynesian diehards that variations in the money supply had the potential to cause major effects on the economy in general and were closely related to variations in the price level in particular.

In the course of re-establishing this earlier-known truth, however, Friedman oversold the monetarists' case in two ways. First, he said that inflation was everywhere and always a monetary phenomenon. This seemed to deny the obvious fact that the price level could rise for reasons other than "too much money chasing too few goods." For example, such forces as powerful unions, rising import prices, and increases in indirect taxes — such as a goods and services tax — are capable of pushing up the price level in the face of an unchanged quantity of money.

Second, Friedman argued that there was a well-defined relationship between that price level and the quantity of money (defined in a particular way) that was stable over the long term. Because of this relationship, all that any central bank had to do was to insure that this quantity followed a precise, stable path in order to ensure the stability of the price level. The ensuing debate raged with great intensity over two decades.[3]

The resolution of the debate about whether inflation was solely a monetary phenomenon turned on the distinction between transitory and continuous causes of price-level changes and between the short- and long-term consequences of inflation. Supply-side shocks, such as increases in rates of indirect taxes, tend to be transitory in their effects. They cause a once-and-for-all increase in the price level. Sustained causes, however, tend to come more from the monetary side of the economy. Furthermore, even if a sustained cause comes from nonmonetary forces — for example, a wage-cost push continually exerted by strong unions — it cannot increase the price level indefinitely unless the money supply increases.[4]

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[3] For an excellent review of this whole debate, see Douglas D. Purvis, "Monetarism in Review," *Canadian Journal of Economics* 13 (February 1980): 96–122.

[4] Thus, inflation can have real causes for quite some time, but if the inflation is to be sustained for very long periods of time, there must be monetary validation. In the long term, therefore, inflation must be associated with increases in the money supply. Inflation can have real effects on such...

The outcome of the debate was the understanding that there is no simple, mechanistic route to monetary stability. The money supply changes for a host of reasons that a central bank can more or less control over shorter and longer periods of time. Thus, central bankers have had to remain artists manipulating the uncertain, rather than automatons implementing the simple policy that Friedman advocated.

The important general outcome of the entire debate was to re-establish, with much more precision, the relationship between inflation and money stated above in italics.

The Breaking of the Sustained Inflation in the 1980s

The major test of the restored views about the efficacy of monetary policy in the advanced Western countries came in the late 1970s and early 1980s. During the late 1960s and the 1970s, the trend of inflation was upward, reaching the two-digit range in most advanced industrial countries by 1980, with help from two oil price shocks. This occurred in spite of a policy of gradually reducing the rate of monetary expansion in an effort to reduce slowly the rate of inflation. The apparent failure of "gradualism" in the second half of the 1970s nearly discred-

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4 - cont'd.

...things as employment, output, and trade for quite some time. In the very long term, however, once an inflation is completed, its effects will be mainly on the price level. (The hysteresis controversy, discussed in later essays in this book, tells us that we cannot assert with confidence that the effects will be *only* on the price level.) It requires some verbal gymnastics to describe all this by saying that "inflation is everywhere and always a monetary phenomenon." But that is merely a slogan. What matters is the understanding about the causes and effects of inflation on both the real and the monetary sides of the economy over various time periods that emerged from the debate.

ited monetary policy for a second time — and this time in the context of its explicit use as an anti-inflationary device.[5]

Then, in the early 1980s, central banks finally decided that enough was enough. Throughout the advanced economies, a monetary crunch drove up interest rates, reduced demand, brought on the most serious recession since the 1930s, and drove down the inflation rate to a range of between 0 and 5 percent, depending on the country in question.

On the one hand, the inflation proved tougher to break than extreme monetarists had predicted. On the other hand, the inflation proved easier to break than extreme Keynesians had predicted. So, at the end of the episode, economists finally got themselves back, with more refined theory and much more evidence, to where they had been at the beginning of the 20th century in terms of their understanding of the basic truths concerning the relationship between inflation and the money supply. In particular, they knew that central banks in advanced Western countries could break inflation if they were willing to impose a sufficiently stringent monetary policy whose outcome would be a recession that might be serious but would not be indefinitely prolonged.[6]

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[5] The main reason why gradualism failed was that, just as the rate of increase of the money supply was being reduced, the rate of growth of money demand began to fall even faster (due to a number of important institutional changes). Thus, there was too much money, rather than too little, and the result was a continued increase in the price level. By emphasizing money supply exclusively, the monetarists had failed to stress the critical importance of money demand and had obscured the fact that the great truths of the early economists related to changes in the relationship between the demand for, and the supply of, money. One reason why the observed relationship between the quantity of money and the price level is not a simple one is that changes in the demand for money (which result in changes in money's velocity of circulation) have effects that are similar to those of changes in the supply of money. In particular, an increase (decrease) in the supply of money has effects similar to those of a decrease (increase) in the demand for money. For an analysis of this period, see Thomas J. Courchene, *The Strategy of Gradualism: An Analysis of Bank of Canada Policy from Mid-1975 to Mid-1977* (Montreal: C.D. Howe Research Institute, 1977).

A Stable Inflation Rate

Throughout the rest of the 1980s, the inflation rate stayed in the 0 to 4 percent range in most countries. In Canada, it remained in the 3½ to 4½ percent range. In a way, one could argue that governments got what they had asked for. When two-digit inflation was being broken by monetary policy in the early 1980s, governments worried about the hardship being caused by the recession that was needed to break inflation expectations. Many of them, therefore, declared in advance that they would consider 4 to 5 percent inflation to be a victory. For example, the Canadian government's "6 and 5" restraint program implied that its goal was to achieve 4 to 5 percent inflation over two years. Inflation of around 4 percent was what the government asked for, and inflation of around 4 percent was what it got.

Although, by the standards of the 1970s, 4 percent inflation was a victory, it is a very high rate by the standards of the earlier part of the century — and of almost all previous centuries (some wartime periods excepted).[7] The reasons for being concerned about 4 percent inflation are examined in detail in subsequent essays. Suffice it to mention two of the most important at this point.

Four percent inflation takes only 18 years to *halve* the purchasing power of money, and with it the purchasing power of everyone's money savings, pensions, and any money incomes or instruments of wealth that are denominated in monetary terms. This is at least the period of time that many people retiring at age 65 on a fixed money pension can expect to live.

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[6] For an analysis of this period, see Peter Howitt, *Monetary Policy in Transition: A Study of Bank of Canada Policy, 1982-85*, Policy Study 1 (Toronto: C.D. Howe Institute, 1986).

[7] For evidence on this matter that in England goes back to the 13th century, see Richard G. Lipsey, "Does Money Always Depreciate?" *Lloyds Bank Review* 58 (October 1960).

With a 4 percent inflation rate and a tax rate of 50 percent, it takes a money rate of interest of 16 percent to produce a real, after-tax rate of return of 4 percent.[8] Short-term interest rates have, however, been significantly lower than 16 percent through the second half of the 1980s, and the net effect is that real, after-tax rates of interest have been low for the suppliers of savings. On the other hand, real, before-tax interest payments have been high for borrowers. Whenever the cost of borrowed funds can be fully deducted for purposes of calculating income for tax purposes, the after-tax interest rate is, of course, lower than the pre-tax rate. However, since all borrowers and all lenders do not face the same marginal rate of tax, and because rules for deducting interest vary among taxpayers, inflation causes major distortions in payments and costs among different borrowers and lenders. Furthermore, by taxing all nominal interest payments instead of just real interest payments, "income" taxes become taxes on capital as well as on income.

Current Canadian Monetary Policy

The Objectives

For these and other reasons, many people (perhaps most of those who have studied the matter) do not regard 4 percent as a desirable rate with which to live forever. Indeed, as Peter Howitt argues later in this volume, if we could establish any given rate of inflation with no cost of getting there, the best choice would probably be zero. So when Governor John Crow announced that zero inflation was to be the Bank of Canada's long-term target, he was setting course for a harbor that few would wish to leave if they found themselves safely in it. The main issue for debate was: Is the advantage of being in the zero-inflation harbor worth the certain costs, and the uncertain risks, of the journey from where we are now to where Governor Crow proposes to take us?

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[8] Sixteen percent yields 8 percent after tax, which is 4 percent real (the other 4 percent is needed to replace the eroding real value of the principal, and is called the "inflationary premium").

Not long after the Governor's announcement, however, the fairly stable inflation rates that most advanced countries had encountered over the previous five years began to rise. The rate in Canada eased up from the 4 percent to the 5 percent range. This was not surprising, because the longest expansion in postwar history was taking the economies of many foreign countries and many (but not all) Canadian provinces close to, and sometimes beyond, their full-employment levels.

The central banks of most advanced countries, including the Bank of Canada, decided that a tightening of monetary policy was required before the observed slow acceleration of the inflation rate got out of hand. For this reason, the debate about Governor Crow's long-term objective became entangled with the debate about his tightening of the monetary screws to deal with the observed tendency of the rate to begin to rise. The result has been to add to the confusion of an already confusing debate. When one hears a critic of current monetary policy, it is usually not clear which aspect of the Bank's policy is being criticized — the attempt to stop inflation from rising above the 4 percent range or the attempt to reduce inflation to the 0 to 1 percent range.

Types of Critics

Anti-inflation policy has real costs. Those opponents who think that the existing government (of whatever party) can do no good will always oppose such a policy by pointing out the effects that these very real costs have on the public. All too often, such critics complain about the cost of the policy without judging the whole policy as a cost-benefit package; they are rarely forced to make clear what their alternative policy would be. It is not enough for them to say that they favor lower interest rates — *ceteris paribus*, all borrowers do! The well-known consequences of this policy have to be laid out and the alternative package of *gain now* for *pain later* judged against the Bank's package of *pain now* for *gain later*.

Many critics just do not like the high interest rates and high Canadian dollar that result from a tight monetary policy, and they seem unconcerned with the reasons why these have been inflicted on the Canadian people. Although this position sounds superficially plausible, it is not a defensible one. A critic who will not contrast his or her preferred objectives of monetary policy with the Bank's current objectives cannot be expected to be taken seriously by responsible policymakers or informed commentators who must ask the question; If we abandon the Bank's current policy, with what policy shall we replace it? To see the importance of this point, it is helpful to distinguish two types of critics.

What I call "unconditional critics" are, either explicitly or by implication, willing to accept any rate of inflation, including those in the three- and four-digit range. Such critics can consistently complain about the pain incurred to contain or reduce the present inflation rate *whatever* its level and speed of change. What I call "conditional critics" accept that there is *some rate of inflation* that should not be exceeded — call it x (and possibly that there is also some maximum acceptable rate of approaching x when the current inflation rate exceeds x — call that rate of approach y). Conditional critics can only be consistent in complaining about anti-inflation policy if the present inflation rate is less than x — or if the present rate of approach to x exceeds y.

Readers of this volume will learn that there is no precise agreement among its contributors on what the value of *x* should be. Some other reasonable people, for example, would set *x* higher than would any of us. So there is a range of *x*'s that can reasonably be defended. There is also a further range of *x*'s that few reasonable persons, and no policymaker, would defend. There is no clear line between reasonable and unreasonable *x*'s. The former would exclude most numbers in the two-digit range, while the latter would certainly include everything above the two-digit range and probably, for most observers, the entire two-digit range as well. For purposes of discussion, people whose *x*'s are in the unreasonable range (unreasonable conditional critics) can be lumped together with unconditional critics, while conditional critics can be considered as only those whose *x*'s are in the reasonable range (reasonable conditional critics).

The great bulk of economists, and most people who have ever experienced very high inflation rates, reject the position of the unconditional (and unreasonable conditional) critics. The unconditional critics' belief that the Canadian economy could function satisfactorily with an inflation rate of 100, 1,000, or 10,000 percent is just not acceptable as a policy guide. Unconditional critics thus command little attention from policymakers since they would accept the unacceptable, and will criticize monetary policies designed to avoid the unacceptable. Those critics who refuse to identify *x* (and, where relevant, *y*), and who complain every time the pain of tight monetary policy is felt, implicitly brand themselves as unconditional critics. They cannot expect, therefore, to be taken seriously by those they seek to influence (although they usually have little trouble gaining a media platform for their criticisms).

The majority of economists, and most other people who think seriously about inflation and monetary policy, are potential conditional critics. They each have their *x*, arrived at through many different processes such as formal research, gathering information from the media, evaluating personal experience, and so on. If the Bank of Canada applies an anti-inflation policy in the face of an inflation rate that is below a person's x (and that shows no tendency to rise above x), that person becomes a conditional critic. In Canada today, someone whose x is 3 will not be a conditional critic; someone whose x is 6 will be. Each can defend with rational arguments his or her x, and hence his or her position as a critic or a supporter of current monetary policy. Each will have a significant number of supporters who cannot be dismissed as belonging to the unconditional critic or unreasonable conditional critic camps.

Sorting out the reasonable conditional critics from the others requires that people state their acceptable policy; therefore, sorting out from the others those who have a claim that policymakers should consider requires that critics state their values for x (and, if appropriate, y). Those who will not do so cannot complain about being assumed to be in one of the other classes of critics.

The Beliefs of the Opponents

Reasonable conditional critics of the Bank's long-term policy fall into two broad groups. Members of the first group disagree on strategy (over the value of x). They think that the gains from a lower rate of inflation are not worth the costs of getting there. Members of the second disagree on tactics (over the value of y). They feel that such things as the timing and the strength of the anti-inflation push were, and still are, wrong. People in this second group feel that the journey to the zero-inflation harbor would be worth making, but at some other time, or at some other speed.

Reasonable conditional critics of the Bank's short-term policy of resisting the tendency of the inflation rate to accelerate and of getting it back to the 4 percent range also divide into these two types. For some who disagree on strategy, x is in excess of 4 percent (although the contributors to this volume would disagree with them). Others disagree on tactics. They feel that such things as the timing and strength of the attempt to fulfill the short-term policy were, and are, flawed.

Some of the critics on tactics in both groups would let the inflation rate accelerate temporarily, buying somewhat lower interest rates (and a lower Canadian dollar) now at the cost of greater monetary tightness later to get back on course at some future time.

Early in 1990, a remarkable number of Canadians fell within one or the other of these two large classes of reasonable conditional critics of the Bank's current policy. Because critics are often not clear about their alternative policies, it is not always easy to classify them into meaningful groups. Below are some of the arguments that the various critics have used. The use of some of these implicitly places a critic into one or another of the conditional or unconditional and tactical or strategic camps. In other cases, various groups can reasonably use the same argument. This is yet another source of confusion in the debate, and yet another reason why critics who wish to be taken seriously by policymakers need to identify themselves as conditional critics of the tactical or the strategic sort by giving listeners some idea of their preferred values for x and y.[9]

The Overall Costs of Reducing Inflation Are Unacceptable

This view comes in many forms, some more reasonable than others. Let us consider a few of these.

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[9] Of course, I am not so naive as to expect critics immediately to follow my advice. I am talking about the logic of the debate, not predicting its real behavior. Nonetheless, I am discussing the conditions needed for critics' ideas to be taken seriously by policymakers as well as the criteria that can be expected when critics and supporters meet for rational interchange of views rather for making political mileage on public platforms.

Any inflation rate is acceptable: This position, which is sometimes held explicitly and more often implicitly, puts the advocate in the camp of the unconditional critics. It is a position all authors in this volume, almost all economists, and virtually everyone who has ever experienced very high rates of inflation strongly reject. I will say nothing more about it except to observe that much of the discussion in subsequent essays, even when explicitly directed at assessing less unreasonable positions, provides the reasons for rejecting this position.

The current inflation rate is below the acceptable rate: Reasonable critics in this camp are conditional critics who hold the view that an inflation rate in, say, the 5 to 10 percent range is acceptable. Once again, all of the authors in this volume would disagree, and much of the analysis in subsequent essays is devoted to explaining why.

The assumed costs of reducing inflation do not exist: Some critics deny economists' basic understanding of the inflation process and the place that monetary policy has in it — an understanding that Douglas Purvis lays out in detail in his contribution to this volume. This is a consistent position for opponents of the Bank's policy, but it is one that the vast majority of economists would argue is based on a factually mistaken position.

In assessing any criticism of the Bank's anti-inflation policy, it is important to identify those who criticize the policy because they dispute the understanding of inflation and monetary policy that economists have developed over more than 300 years. We can, according to these critics, have our cake and eat it too: we can have lower interest rates, a lower Canadian dollar, and less (or at least not more) inflation all at the same time. Such critics may, of course, be right. But if they are, they know something that has been missed by generations of economists stretching back to David Ricardo in the 19th century and even further, to David Hume in the 18th. It issurely, therefore, up to such critics to explain in detail the basis for their refutation of economists' accumulated theory and evidence on the relationship between monetary policy and inflation.

Some critics hold this view quite explicitly; others hold it only implicitly. For example, those who advocate much lower "made-in-Canada" interest rates without explaining how they would deal with the resulting acceleration in inflation usually fall into this group. Once again, the arguments of all such critics cannot be evaluated unless it is clear that they are based on a rejection of what Purvis calls the economists' consensus model of the inflation process.

Any change to a more restrictive monetary policy creates opposition: Few outside the economics, business, and financial communities oppose a loosening of monetary policy whenever it occurs. However, opposition to current policy almost always builds up when policy is tightened.

Many of those who now oppose attempts to reduce the rate of inflation also opposed similar attempts in the early 1980s, when the inflation rate was in the two-digit range. Today, however, few advocate going back to two-digit inflation. Yet getting to 4–5 percent from 12 percent was costly and inflicted some real hardships on the public — not a few, for example, had their mortgages foreclosed when they could not meet the rapidly rising interest rates. People who opposed the anti-inflation policies of the early 1980s and who criticize present anti-inflation policy should be made to specify their preferred strategy for the 1990s. Where would Canada be if it alone among the advanced industrial countries had left its inflation rate in the two-digit range? Is there any inflation rate that such critics would take as undesirable, or is 100 percent as good as 10 percent or 1 percent? If they do not respond, they risk being dismissed as being in the camp of the unconditional critics. Some people, however, have short memories. They forget the pain caused by the anti-inflation policies of the early 1980s, and have little idea of the pain that Canadians would have to undergo once again if the Bank allowed the inflation rate to run up to two-digit levels, only to have to fight it back to the 4–5 percent range.

Anti-Inflation Policy Is Too Unequal in Its Incidence to Be Acceptable

Another class of criticisms is based on a real, or alleged, inequality in the incidence of anti-inflation policy. It is not always clear if these critics oppose any attempt to maintain or reduce the existing inflation rate. The usual admonition holds here: unless such critics state the short- and long-term monetary policy that is to replace the present one, their criticisms cannot be evaluated. Here, nonetheless, are some of the criticisms that are typically found in this category.

Some provinces pay the price while others reap the benefits of anti-inflation policy: The provinces have been persistent critics of the Bank's anti-inflation policy. They do not carry responsibility for ensuring a reasonably stable monetary environment. They do however, bear some of the costs. That they complain about these costs is as inevitable as it is understandable. Provincial complaints have at least two aspects.

One substantive reason for provincial complaints starts with the observation that inflationary pressures are not felt uniformly in all provinces and, indeed, are almost totally absent in some. Those provinces in which there is still substantial economic slack feel aggrieved that they must pay the price, in terms of high interest rates and declining exports earnings due to the high Canadian dollar, for curing a malady that is not of their making. One can feel sympathy for their concern, but their complaints do not justify opposition to anti-inflation policies. The reason for this is important and not always understood, so we must look at it carefully.

Relative prices among provinces are set mainly by such real market forces as export demand, provincial employment and income levels, population, and the general attractiveness of the various provinces as places to produce, work, and live. This means that changes in the *general level of prices* in each province *that are due to changes in the national money supply* must be closely correlated with each other. If they are not, then changes in monetary conditions would alter drastically the relationship among provincial price levels. Because this does not happen, sharp general price increases in the central provinces mean that similar price increases will not be far behind in the other provinces. *It is quite impossible for some provinces to have a sustained inflation that is not experienced by all provinces.* Thus, if the Bank of Canada allows an inflationary head of steam to develop in some provinces because economic conditions are still slack in many of the others, that inflation will spill over to the rest before long.[10]

To separate interprovincial considerations from other issues, start with a situation in which the overall Canadian inflation rate of, say, 5 percent is above most people's acceptable inflation rate of, say, 4 percent or less. Since the Canadian price level moves pretty well as a unit, with only small lags of months or at most a year or so, it follows that every province faces the same tradeoff between a more restrictive monetary policy and more inflationary pressures. It is upsetting to have to suffer the costs of anti-inflation policy without having the benefit of the booming economy that is the cause of the inflationary pressures in the first place. Nonetheless, once inflationary pressures develop in a significant number of markets, the tradeoff becomes the same for all provinces: suffer more inflation or suffer the costs of a tighter monetary policy. If they opt for a looser monetary policy, then the inflation in the provinces experiencing excess demand will be greater than it would otherwise have been. As a result, the restrictions that must be applied sooner or later to get the inflation rate down again will also be harsher than they would have been if they were applied now. In pleading for a less tight monetary policy, the provinces that are currently free from heavy local inflationary pressures are not pleading for a lower average rate of unemployment over the whole cycle, but merely for a cycle of larger amplitude — less unemployment now as the boom is prolonged, and more unemployment later when tougher monetary policies are needed to break the higher rate of inflation.

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[10] This is no mere unsupported theory; that it is cold fact can be seen by correlating the inflation rates in the various provinces decade by decade. The result is that inflation rates are almost the same, differing only by the relatively small magnitudes needed to adjust relative prices in expanding and contracting provinces. Thus, all provinces are in the same inflation boat decade by decade, even though it may not seem so month by month.

The second, and less defensible, reason for the provinces' opposition to anti-inflation policies is that they can win political points by opposing the imposition of costs on the public. They have few political points to lose by taking this stand; if it is followed and if it turns out to be wrong, someone else will take the blame.

Provinces thus may oppose tight monetary policy for very good reasons, or just to cash in on the political free lunch. Either way, their natural position is to complain against the Bank's policy whenever it requires high or rising interest rates. This is why, for better or for worse, provinces cannot expect to carry a lot of weight in the debate — their advice is just too suspect.

Anti-inflation policy benefits mainly the rich: The defenders of the poor and the underprivileged often oppose reducing inflation on the grounds that the rich are the main gainers from a successful anti-inflation policy. The argument that the rich are the ones who mainly gain from controlling inflation has swayed many a neutral observer at many times in the past.

There is some evidence that, in the United States over the past several decades, the poverty rate has varied negatively with the inflation rate. Much more needs to be known before a causal relation is inferred. Nonetheless, very poor Americans seem to have fared better during periods of higher rather than lower inflation rates.

Another point is that by raising short-term interest rates temporarily, anti-inflation policies do benefit lenders and harm borrowers. There may be some overall tendency for borrowers to be richer than lenders, but, if so, the relationship is a weak one. After all, some takeover artists are gigantic borrowers on the junk bond market while many retired persons with modest incomes are lenders because their wealth is held in such forms as savings accounts, Treasury bills, and Canada Savings bonds.

In the absence of extensive research on the redistributions that inflation causes at all levels of income, there is reason to believe that the relationship may not as simple as: the lower one's income the more one benefits from inflation, and the higher one's income the more one loses. If the self-interest groups in the battle against inflation were squared up in this simple, income-class manner, life would be much simpler than it probably is.

One reason for doubting that the relationship between income and the gains and losses from inflation is a simple one is that many of the rich (or the financial advisors they can afford to employ) are financially sophisticated enough to be able to hedge against inflation, and often to benefit from it. It is the less sophisticated — those who believe that a buck really is a buck — who are often among the biggest losers. Consider just two examples.

- It is disheartening to try, as I have on several occasions, to explain vainly to a not-very-well-off widow, with a life expectancy measured in decades, that the 12 percent she is earning on her government bonds is not all income. If she is to preserve the real value of her capital, and hence her real-income-earning potential, she must save — and reinvest — an amount equal to the value of her capital multiplied by the inflation rate. I have seen all too many such people regard their whole interest earnings as current income and then watch as their real incomes are eroded at the current inflation rate. Twenty years of this can reduce an initially satisfactory income to the poverty level.

- One of the best hedges against inflation is an owner-occupied home. Yet the lower one goes down in the income scale, the more likely it is that people rent their dwellings with little or no other equity in an inflation-proof asset.

It is all too easy to become emotional in defense of some lower-income groups who apparently suffer from anti-inflation policies while forgetting that they also suffer from continued inflation. Rational altruism in defense of the less well off requires a careful assessment of what both inflation and anti-inflation policies do to such people.

Anti-inflation is part of the conservative agenda: It is often said today that control of inflation and the federal deficit are part of the Canadian (small "c") conservative agenda and, therefore, are to be opposed by nonconservatives of the center and the left. The implication is that conservatives are the ones who will gain disproportionately from the control of inflation, while others will lose.

The evidence is, however, that an uncontrolled inflation and budget deficit hurt almost everyone while they are occurring. Furthermore, the longer the inflation goes on and the higher it is allowed to rise, the greater is the recession required to bring it under control. For both these reasons, those who have a personal stake in controlling inflation now, rather than later, are not found exclusively, or even preponderantly, in the upper-income levels, or among other "conservatives."

Nonetheless, there are political points to be made by asserting the statement made in the heading. After all, those who do not understand the costs of inflation are among those who lose most from it. If the less well off are in this group, they will see the costs imposed by the government's anti-inflation policies while not appreciating its benefits. So the critics get a political free lunch by opposing anti-inflation policies on behalf of those on the left and the poor.

Although the Costs of Reducing Inflation Are Acceptable, Current Policy Is Misguided

Another group of critics accept the Bank's short-term policy of returning to a 4 percent inflation rate and possibly also its long-term policy of moving toward a zero-inflation rate, but they argue one or more of four points about either or both of these policies: (i) that the policy is being applied at the wrong time; (ii) that it is being applied with too much strength; (iii) that it has been applied for too long; (iv) that it is not acceptable because monetary policy is being asked to do too much. These criticisms have tended to be directed at current tight monetary policy both to contain the present tendency for the rate to accelerate and to reduce the present rate slowly toward zero.

The wrong time: An important group of people, including many in the business community, argue that although the Bank's policy is the correct one in general, it is being instituted at the wrong time. In particular, the first few years of the Canada-U.S. Free Trade Agreement present an unparalleled opportunity to restructure Canadian industry domestically and to gain export markets. However, high interest rates are making the former difficult, while the high external value of the Canadian dollar (which is partly a consequence of high interest rates) is doing the same to the latter. According to this argument, the Bank should ease off a bit and allow inflation to rise a bit, as the cost of keeping interest rates and the dollar down a bit during this critical period of adjustment to the Agreement.

The extent to which this argument is taken seriously depends on the extent to which the current opportunities really are of the once-and-for-all variety. If the effect of the anti-inflation policy is merely that some of the restructuring is postponed for a year or so, and that some of the new export markets are won next year instead of this year, then this is the typical short-term pain for long-term gain associated with reducing inflation. If, however, markets are lost to other competitors, never to be regained, then the costs may well be too high.[11] Frankly, no one knows which possibility is more likely to occur. It certainly is unfortunate that the monetary crunch came just at the time that the Agreement's first favorable influences were being felt. We do not know, however, if long-term adaptation to the Agreement would be significantly different if monetary policy were made less tight than it otherwise would have been in order to assist that adaptation.

The need for caution in the face of uncertainty makes this a strong argument for easing up a bit on restrictive monetary policy. Although the argument cannot be rejected with certainty, it is worth noting that *no time seems the right time to suffer pain now for gain later*. Since there is always some strong reason for not suffering pain now, there never seems a "right time" for such a policy. If one waited till the "right time" to institute anti-inflation measures, inflation would continue to rise over time.

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[11] What lies behind this dispute is the technical issue of hysteresis. Is the long-term state of the economy dictated by underlying conditions and more or less independent of the short-term path taken to get there, or is the final state strongly influenced by the path taken to get there? The former corresponds to neoclassical economics and predicts that the short-term pain will have no long-term unfortunate consequences. The latter position is suggested by some recent theories, and holds that the greater the short-term pain inflicted on the economy the worse the long-term position to which it will gravitate.

The wrong strength: The second argument is that the Bank is pursuing its policy too strongly. What matters here is how much deflationary pressure can be put on the economy by each tightening of the monetary screws and, hence, at the price of each given reduction in demand and employment. There is some evidence to suggest that, starting from a period of general excess demand, the initial reduction in total demand has large effects on reducing inflationary pressures — that is, it has more effect on prices than on output and employment. Further reductions, however, have rapidly diminishing effects on reducing inflationary pressures — that is, they have less and less effect on prices and more and more on output and employment.[12] If this is so, there is an argument for gradualism — the attempt to put slow pressure on the economy to reduce the inflation rate slowly. If the pressure is put on too quickly, there is a valid argument — if this view of the working of the economy is correct — against too tough a stance for monetary policy.

The wrong duration: The third point that critics in this group argue is that monetary policy is subject to long lags. It can take up to 12 or 18 months for the first major effects of a change in the stance of monetary policy to be felt throughout the economy. When monetary policy causes interest rates to change, spending plans have to be revised, and the revised plans have to be acted on; furthermore, the secondary effects of the induced expenditure changes take time to ripple through the whole economy. This is true both of a monetary expansion and a monetary contraction. Governor Crow, in a series of speeches throughout 1989, made it clear, however, that he was not going to ease up on the current tight monetary policy until there were real signs that the inflationary pressures were abating. This suggests that the Bank might be acting on the assumption that the main effects of its policies are felt quite quickly.

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[12] The technical point here concerns the shape of the short-term Phillips curve. The curve may be steep at low levels of unemployment, but it quickly becomes rather flat at somewhat higher levels of unemployment. If so, then most of the anti-inflation benefit of restricting demand when unemployment is low comes from the first relatively small restrictions, and further restrictions give less and less additional moderation of inflationary pressures. Even these shrinking gains are bought at the price of increasing losses of output and employment. It should be noted that the argument for gradualism based on the existence of a highly nonlinear Phillips curve is mitigated somewhat by the uncertain environment in which monetary policy is inevitably conducted. If the Bank is not sure of the value of the nonaccelerating inflation rate of unemployment (NAIRU), attempting to operate the economy with only a small deflationary gap increases the risk that it could end up with an inflationary gap for some time (as apparently happened in the early 1970s, when the NAIRU rose unnoticed).

If the lag story is correct, and if the Bank persists in its tight policy until the economy shows signs of weakness, there is a danger that the Bank's policy may cause a larger recession than is needed to reach its anti-inflation targets. On the other hand, the Bank's desire to reduce the underlying rate of inflation below 4 percent, rather than just to return it to the level from which it recently accelerated, provides reason for persisting with monetary tightness longer than might otherwise be expected.

Operating a policy that has long and variable lags is a very difficult art. If some specific measure of the money supply were as reliable an indicator as Milton Friedman thought it was, it would simply be necessary to maintain a steady rate of monetary expansion through thick and thin. That, however, is not the case; instead, the Bank must judge its policies by looking at an array of interest rates along with another array of money-supply magnitudes. If the Bank varies interest rates according to the current performance of the price level, it risks destabilizing the economy because of the long lags. It is also a reason for following as closely as possible Friedman's advice to set the monetary levers with medium- and long-term goals in view and not to try to use monetary policy for short-term stabilization objectives.

This is not an issue that the contributors to this volume discuss in any detail, but it is nonetheless a matter of real concern. After one more cycle of recession and recovery, we may have a better idea of just how much the lags can upset the smooth operation of a fairly steady anti-inflation policy. Right now, we must merely note that one can make a strong theoretical case that it is potentially destabilizing to adjust interest rates according to whether the current rate of inflation is above or below some target level.

Monetary policy should not be asked to do the whole job: In an ideal world, the federal government would be reducing its very large budget deficits at a much faster rate than is now the case. The required cuts in government expenditures would have introduced some fiscal contractionary effects on total demand that could be offset by some monetary expansion. The more relaxed monetary policy would lower interest rates and the Canadian dollar, allowing the reduction in government expenditures to be offset by an increase in investment and exports. Total income and employment would be unchanged and its composition would be altered in a desirable direction.

We do not, however, live in an ideal world. Fiscal policy is what it is, and Governor Crow must take it as given. Critics must beware of making the best the enemy of the good. There is a better policy mix for curing inflation, and it would consist of a more restrictive fiscal policy and a somewhat less restrictive monetary policy. The absence of this best policy mix is not in itself, however, a justification for abandoning the policy of fighting inflationary pressures with whatever policy instruments are available.

The Issues

The major issues in inflation policy should be clear, at least in outline, from what I have said already. In any case, they are discussed in much more detail in the subsequent essays.

Nonetheless, by way of summary and as a lead into what is to come, here is a brief outline of what I see as the major issues and nonissues.

That anti-inflation policies have costs, and that these costs can be substantial, is not an issue — although measuring the exact amount and incidence of the costs is. The same can be said about the magnitude and incidence of the costs of a continued inflation.

The consequences of easing any given anti-inflation policy when inflation is at or above the accepted target rate is not an issue among economists: the inflation rate will be higher than it otherwise would be, and future anti-inflation policies will have to be tougher than they otherwise would be. So the policy has the effect of reducing pain now at the cost of more pain in the future. Whether such a policy is desirable depends on the magnitudes of the tradeoff; these can vary from circumstance to circumstance, so that such a policy cannot be dismissed in general. It must instead be judged on its merits, case by case. When this is done, however, one must be aware of the bias toward postponing the up-front pain of anti-inflation policies for as long as possible. The likelihood is that such postponements will serve only to increase the magnitude of the short-term pain that will be suffered when the monetary authorities finally decide that they can no longer accept the current level and rate of change of inflation.

Whether the costs of reducing the underlying rate of inflation significantly below the 4 to 5 percent range — where it was in Canada through most of the latter part of the 1980s — are acceptable is an issue. Some critics seem to believe that the costs of any reduction in inflation below its present level outweigh the benefits. In contrast, the contributors to this volume argue that the benefits of reducing the rate below where it now is probably outweigh the costs, but that the benefits of going all the way to zero may exceed the costs. Others will argue that the benefits of a completely stable price level are so great that the Bank should plan to go to zero. Here, there is room for differences in assessing the evidence and in evaluating gains and losses.

The Bank of Canada and the Pursuit of Price Stability*

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> *"What this country needs is sound money, and plenty of it!"*
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> Source unknown

Introduction

In the January 1988 Hanson Memorial Lecture at the University of Alberta, Bank of Canada Governor John Crow explicitly announced that "price stability" was the Bank's long-term objective for monetary policy. Specifically, he said that "monetary policy should be conducted so as to achieve a pace of monetary expansion that promotes stability in the value of money. This means pursuing a policy aimed at achieving and maintaining stable prices."[1]

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[1] John W. Crow, "The Work of Canadian Monetary Policy" (Eric J. Hanson Memorial Lecture delivered at the University of Alberta, Edmonton, Alberta, January 18, 1988. Reprinted in *Bank of Canada Review*, February 1988), p. 4.

While public debate and official policy pronouncements had long accepted that the Bank has a mandate to control inflation, this announcement of an explicit target of price stability, widely interpreted to mean zero inflation, was apparently designed to signal a new direction for monetary policy.

Mr. Crow's dramatic announcement, like Governor Gerald Bouey's commitment to "monetary gradualism" in 1976, has proven controversial, and has served as a focal point for debate on Canadian monetary policy. This essay attempts to contribute to that debate by assessing various aspects of the price-stability target and by evaluating current monetary policy in the context of that long-term target. Throughout, the term "monetary policy" refers to control of the money supply — or, more specifically, of the rate of monetary expansion — by the Bank of Canada.

Before one can address the desirability of zero inflation, it is necessary to consider what such a target might mean.

Clearly, it does not literally mean that some price index will be constant, so that it experiences continual zero change. No serious theories or available evidence about the effects of monetary policy on the economy suggest that such a precise target is at all feasible, and most economists would argue that attempting even roughly to achieve such a target would involve excessive fine-tuning. Some month-to-month, quarter-to-quarter, and even year-to-year variation in the inflation rate must be admitted as part of any medium-term plan to control inflation. Thus, the goal of attaining zero inflation must apply to some average change over some extended period of time. How long a period of time the Bank has in mind is not clear. One must guess that the averaging period is longer than a quarter but less than a decade.

These problems with the literal interpretation of zero inflation presumably lay behind the Bank's preference for "price stability" over "zero inflation." However, they should not obscure the fact that, whatever term is used, Governor Crow's announcement affirms a strong commitment to controlling and reducing inflation over the long term. I shall use "price stability" to describe this commitment; later, I return to the question of whether this commitment is all that matters, or whether there is merit in going all the way to a precise zero-inflation target.

A second question that immediately arises in considering the goal of price stability is: When is the target to be achieved? The Bank has been quite vague on this issue, possibly intentionally so; however, one's views on the desirability of price stability might well be influenced by whether it is a two- or a ten-year plan, and by conditions in the economy. Given that Canada's inflation was at double-digit levels early in the 1980s, and appeared to stabilize at the 4 to 5 percent range over the 1984–89 period, how fast can it reasonably be brought down further? Should the Bank pursue its target gradually, so that zero inflation is achieved only in a period of, say, ten years, or should the "cold-turkey" approach be used to achieve it by, say, the end of 1990? Drastic as the latter alternative may seem, many attribute the failure of monetary targeting in the late 1970s to its excessively gradual implementation.[2] As a result, some analysts argue in favor of the cold-turkey approach. This view is to some extent reinforced by the experience of the early 1980s, when severe monetary brakes were applied (first by the U.S. Federal Reserve and subsequently by the Bank of Canada), and inflation fell quickly from over 11 percent to about 4 percent. Others argue that, while zero inflation would be a desirable state if one could start there, getting there from the current state of the Canadian economy is not worth the cost.[3]

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[2] The classic reference is Thomas J. Courchene, *No Place to Stand? Abandoning Monetary Targets: An Evaluation* (Toronto: C.D. Howe Institute, 1983). See also the discussion in Charles Freedman, "Monetary Policy in the 1990s — Lessons and Challenges" (paper presented to the Economic Policy Symposium hosted by the Federal Reserve Bank of Kansas City, Kansas City, Missouri, 1989).

[3] See, for example, R.F. Lucas, "The Bank of Canada and Zero Inflation: A New Cross of Gold," *Canadian Public Policy* 15 (March 1989): 84-93.

The Effects of Monetary Policy

While understanding of monetary mechanisms in the economy is incomplete, and controversies prevail over (possibly important) details concerning the operation of monetary policy, nevertheless there is a broad consensus over some "core truths" that are worth identifying at the outset. These core truths emerge from what one might identify as a "core macroeconomic model."[4]

A Core Macroeconomic Model

For almost 40 years following World War II, disagreements among macroeconomists were dominated by the ongoing debate between two groups — the monetarists and the Keynesians. However, the differences between the two groups tended to arise in the context of the relatively short-term behavior of the economy; there was, in fact, considerable agreement about medium-term issues. In particular, both groups accepted the key features of the core macroeconomic model of the economy, which can be described as follows:

- In the long term, national income is equal to its capacity, or full-employment, level as determined by available technology, with all resources — including labor — being employed at their "normal, capacity levels of utilization." The unemployment rate that prevails when national income is at its potential level is often referred to as the "natural rate of unemployment." While the level of potential national income can be influenced by structural and other microeconomic policies, it is not influenced by macroeconomic stabilization policies or by other sources of fluctuations in aggregate demand.

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[4] See, for example, Freedman, "Monetary Policy in the 1990s," who presents a virtually identical model as the "mainstream central bank model of recent years."

- In the short term, the actual level of national income can deviate from the capacity level. The actual level of national income is influenced by aggregate demand, which, in turn, depends on private expenditure decisions, on conditions in financial markets, and on the stance of monetary and fiscal policy. The difference between potential and actual income is referred to as the "GNP gap." When the GNP gap is positive, actual GNP (gross national product) is less than potential, and the actual level of unemployment is above the natural rate. When the GNP gap is negative, actual GNP exceeds potential, and the actual level of unemployment is below the natural rate.
- Deviations of national income from its capacity level give rise to pressures on wages and prices, which, if allowed to operate, would eventually restore full employment. The dependence of these inflationary or deflationary pressures on the level of economic activity is summarized in the "Phillips curve," and the term "natural rate of unemployment" has given way to the term NAIRU — an acronym for non-accelerating inflation rate of unemployment. Note that there is no long-term tradeoff between the rate of inflation and either the level of economic activity or the rate of unemployment. The Phillips curve also allows for the role of expectations about the future course of inflation. In the past ten years, economists have stressed that these expectations will also depend on views about the future course of policy.

Some Core Truths about Monetary Policy

Disagreement between monetarists and Keynesians arises within this common framework due to differences in views about the stability of private-sector behavior, about the efficacy of policy activism, and about the strength of the automatic adjustment mechanism. For our purposes, however, the important point is that there is strong agreement arising out of the core model about the role of money in the economy and about key aspects of monetary policy. These can be summarized in terms of the following core truths.

Monetary policy has strong effects on the economy: too much money stimulates the economy and too little restricts it.

In the stark form in which this statement appears, there is very little controversy about it; complications arise in assessing how much money is "too much" and how much is "too little." In a world with well-behaved monetary aggregates such as M1 and M2 and with stable financial institutions, this is a relatively straightforward exercise. Indeed, it is in this context that the Bank of Canada espoused monetary gradualism in the 1976–79 period: the Bank thought that it could identify a rate of growth of the money supply appropriate for continued real growth and gradual disinflation.

The hazards involved in trying to identify the appropriate rate of growth of the money supply were made clear by the problems that monetary gradualism encountered. While the Bank was generally quite successful in meeting its targets, "surprises" of various sorts — including supply shocks in the "real" sector and rapid innovations in the financial sector — meant that this did not translate into success in terms of the Bank's ultimate targets for the economy. Thus, in the early 1980s, monetary aggregates — in particular, M1 — declined in influence at the Bank, and in 1982 the Bank abandoned its formal monetary targeting exercise.

In the early 1980s, the Bank also initiated a sharply anti-inflationary policy stance; the resulting recession and reduction in inflation stands as strong testimony to the power of monetary policy.

In today's environment of unstable behavior of monetary aggregates, deregulation of financial markets, and rapid pace of financial innovation, any attempt to identify precisely the stance of monetary policy is bound to be controversial. But in assessing monetary policy, the following conclusion is important: the difficulties in identifying precisely whether the stance of monetary policy is expansionary or contractionary at any point in time should not obscure the important truth that monetary policy does exert strong effects on the economy, and thus has the potential to confer either great benefits or great harm.

The immediate effects of monetary policy are on asset markets — interest rates, exchange rates, and stock prices.

Changes in the money supply affect the liquidity position of financial institutions and so set in motion responses that influence their behavior and that of their customers. Interest rates, exchange rates, and stock market prices respond quickly to such changes. These changes are important in their own right, and also because they serve as the "link" between the financial sector and the real sector — including retail and wholesale trade, manufacturing and services.

The interaction between these asset-market responses — and the exact nature of the linkage from monetary policy to the real sector — are complicated. For example, the interest-rate/exchange-rate nexus is the subject of ongoing discussion in the financial press. In a stable setting, a higher domestic interest rate typically means an appreciating domestic currency; both play a role in transmitting the effects of a tighter monetary policy to the real sector of the economy. But, as we shall see, this nexus can be upset by a number of factors. Understanding the linkage involves making the important distinction between real and nominal interest rates, and taking account of other factors — including expectations about future economic policy — that influence financial variables. As a result, the exact nature of the linkage will vary with different circumstances.

The complex nature of asset-market responses to various influences further complicates the analysis. For example, in the face of changing expectations about the prospects for inflation or economic performance, rising interest rates and a weakening currency can occur together, as can the combination of falling interest rates and a strengthening currency. Such changing expectations about economic prospects can be triggered by changes in current monetary policy or by changes in expectations about the future course of monetary policy. As a result, it is misleading to think of the interest-rate/exchange-rate nexus as a tradeoff depicting alternative combinations for the monetary authority to choose from. These complications and controversies should not, however, obscure the fact that monetary policy can exert a strong influence on the real sector of the economy.

The effects of monetary policy on real variables such as gross domestic product (GDP) and employment occur with a lag that can be long and variable — the peak effect can often occur after a period of two years or more.

The financial-market effects identified above influence the spending decisions of firms and households, and so set in motion responses throughout the economy. As a result, GDP and employment will change, although both the extent and the timing of the change can vary greatly from episode to episode. However, two statements can be made about the nature of the response.

First, the response of output and employment to a change in the money supply is not immediate, but occurs only with a substantial and variable lag. Second, after four or five years, very little effect on output or employment can be attributed to a given change in the money supply, and after a longer period no effects remain.

The first statement provides the essence of the case against using monetary policy to fine-tune the economy. Since its short-term effects are so unpredictable, it is undesirable to alter monetary policy on a week-to-week, or even quarter-to-quarter, basis to offset fluctuations in economic activity. As often as not, such attempts will have perverse effects, and such policy activism will have destabilizing effects on expectations of and confidence in the economy. The second statement, which is often referred to as the "natural rate hypothesis," brings home the fact that, simply by controlling the money supply, the Bank of Canada cannot reasonably expect to alter permanently the real economic prospects Canadians face. The two statements combined suggest that monetary policy is not a very precise instrument with which to try to control output and employment in the short term, and it is essentially completely ineffective in the long term.

After an extended period — say, five years or more — the effects of monetary policy fall exclusively on the price level.

This is the counterpart to the previous core truth; over a long enough time period, the effects of monetary policy on output and employment are entirely dissipated by the wage and price responses that are ultimately induced. The changes in spending decisions caused by monetary policy initially trigger changes in production and employment in the economy, but as the level of activity in the economy changes, wages and prices respond. If no further money-supply changes occur, the changes in wages and prices eventually will lead to output changes that offset those that occurred initially.

For example, an increase in the money supply will stimulate the economy. The resulting increase in output and employment will create demand pressures in product and labor markets, and thus eventually lead to increased upward pressures on wages and prices. These in turn will tend to discourage demand, and will lead to reductions in output and employment. If this process were to work itself out completely without further disturbance, the only enduring effect of the change in the money supply would be on wages and prices. This suggests that monetary policy is potentially an effective instrument for controlling inflation over the medium term.

In order to lower interest rates in the medium term, the central bank has to raise them in the short term.

This apparently paradoxical statement is one that is commonly misunderstood in the press and in public debates on eco-nomic policy. Yet it follows directly from the previous core truths. Note that the discussion pertains to the level of nominal interest rates, since, as a first approximation, real interest rates are independent of monetary conditions in the medium term.

The reasoning behind this core truth is straightforward. Tight monetary policy first drives up real and nominal interest rates. This, combined with the exchange-rate effects that it triggers, serves to reduce the pace of economic activity and thus to reduce inflation. Gradually, the real interest rate returns to its "normal" level. If the central bank perseveres with its anti-inflationary stance, expectations of inflation will eventually fall. As both actual and expected inflation fall, nominal interest rates will fall to a level lower than that which prevailed before the disinflation.

As many central banks have discovered to their regret, this relationship also works in reverse. Attempts to cut interest rates now by easing monetary policy will fuel inflation and expectations of inflation, and thus serve to increase interest rates in the future. The easing of monetary policy leads to increased inflation and expected inflation, which, in turn, lead to higher nominal interest rates. Thus, the best way to achieve low interest rates over the medium term is to pursue a monetary policy that assures that inflation will be low over the medium term.

The effects of monetary policy depend heavily on expectations in the market and on the credibility of the monetary authority.

Actions of the Bank of Canada are subject to interpretation by participants in the economy — in particular, by agents in financial markets. These interpretations, in turn, will influence how monetary policy affects the economy. For one example, consider a change in the money supply that had been widely anticipated. Evidence suggests that such a change can lead directly to adjustments in wages and prices, and thus largely short-circuit the employment effects identified above. In its extreme form, this argument would hold that only "unexpected" changes in the money supply have any impact on output and employment.

For another example, a change in the money supply that is widely perceived to be permanent will trigger a different response than one that is perceived as temporary. Consider a policy introduced by the Bank to reduce inflation, which involves the introduction of monetary restraint and, in the first instance, a rise in interest rates and unemployment. If market participants doubt the Bank's resolve to take the heat caused by the combination of high interest rates and high unemployment, they will expect the policy ultimately to be reversed, and consequently will not revise downward their expectations of inflation. This will reinforce the inflationary inertias in the economy and hence prolong the period of high unemployment required to reduce the actual inflation rate. If, however, the Bank's announced intentions are credible, inflationary expectations will fall more rapidly, and inflation can be reduced at lower cost in terms of unemployment and lost output.

For these reasons, monetary changes are often accompanied by Bank announcements that can be interpreted as attempts to influence, or to condition, the expectations that are generated; if these announcements are credible, they can influence the way the economy responds to the policy change. A key implication of this is that the Bank of Canada and other central banks can try to invest in their credibility. For example, since assuming office, Governor Crow has taken a number of steps to bolster his reputation as an "anti-inflationist," presumably in the belief that achieving this reputation will reinforce any anti-inflationary policies that the Bank actually follows.[5]

It is important to recognize, however, that credibility cannot be obtained cheaply; it comes only with steadfast actions in pursuit of the Bank's stated target. Furthermore, it appears that credibility can be easily dissipated; actions taken either by the Bank itself or by the government of the day that can be interpreted as inconsistent with the Bank's professed goal will not only have direct market effects that are inconsistent with the goal but will also raise a red flag to market participants to watch for a possible weakening in the Bank's commitment to its stated objectives.

The policy-induced disinflation that occurred in the early 1980s is instructive in this context. Tight policies were introduced in both the United States and Canada, but inflation fell much more quickly and the accompanying unemployment was both smaller and more short-lived south of the border. Proposed explanations of this difference have included the higher Canadian debt-equity ratio, the existing distortions in the Canadian energy sector, and the importance in Canada of the worldwide decline in commodity prices. However, a number of commentators have attributed some of the variance to differences in credibility. The credibility of the chairman of the Board of Governors of the Federal Reserve, Paul Volcker, was apparently quite high, and was reinforced by the support he was given by President Reagan. In Canada, the credibility of the

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[5] See also the discussion in Lucas, "The Bank of Canada and Zero Inflation," pp. 88-89.

Bank of Canada was suspect, given the failure of its earlier attempts to disinflate *via* gradualism, and given the recurring question of whether then-Governor Gerald Bouey had the full support of the Trudeau government. In any event, the Bank persevered, inflation fell, and output and employment experienced a sustained recovery. Some of the lost output and employment incurred during this experience can be written off as an investment in the authorities' credibility in their future commitment to low inflation; if this credibility is blown by allowing inflation to increase from its current level, then the cost of disinflating in the next episode might be much higher.

These "core truths" suggest that an ideal monetary policy disciplines central bank operations in a way that discourages procyclical policies, cumulative error, and destabilizing speculation about future policy while also providing flexibility to respond to major developments. Thus, an ideal policy will prevent some problems from arising while preserving the freedom to react to some uncontrollable ones that do arise.

Choosing an Operating Framework for Monetary Policy

In discussing alternative operating frameworks for the Bank of Canada, it is useful to distinguish between the Bank's ultimate policy targets and its policy instruments. The discussion above clearly suggests that the Bank should pursue nominal rather than real targets. For example, targets in terms of the inflation rate or the rate of growth of nominal income are feasible, while those in terms of the unemployment rate or growth in real national income are not. The discussion also suggests that these targets should be pursued as medium-term ones, rather than as ones to be achieved either immediately or continually. In other words, the Bank should avoid trying to fine-tune, because attempts to do so would involve excessive variation in the setting of its instruments — often referred to as "instrument instability." Further, because of the length and variability of lags in the response of the target variables, such attempts might destabilize the policy targets.

There are three distinct operating modes that the Bank might adopt in pursuit of its policy objectives. The first is discretionary policy, whereby it reserves the freedom to "respond" to all events in the economy in a manner determined on a case-by-case basis as circumstances arise. The second is the opposite case of a simple policy rule, whereby the Bank commits itself in advance to a course of action through a specific policy instrument (usually the money supply) and pursues this course regardless of developments in the economy. The third is the intermediate case of a contingent policy rule, whereby the Bank identifies clear policy objectives and its intended means of attaining them while also making explicit allowance for deviations in response to developments in the economy.

Discretionary Policy

The case against adopting a discretionary policy regime rests in part on the traditional case against fine-tuning the economy. The lags and uncertainties identified above mean that constantly changing monetary policy in an attempt to fine-tune the economy embraces the strong risk of destabilizing the economy. Policy can become procyclical, as when stimulus is provided in response to a perceived downturn only to discover, by the time the policy's effects take hold, that the economy has turned up due to other factors or that the initial perception of a downturn was simply wrong.

Alternatively, policy could be subject to cumulative error; if the effects of initial monetary stimulus are slow to materialize, more stimulus might be perceived as necessary. When the full force of the repeated stimulus is eventually felt, the initial unemployment problem is replaced by an inflation problem. If allowed to continue for an extended period, the inflation becomes entrenched and thus difficult to combat; if reacted to quickly, the economy is subjected to a destabilizing pattern of "stop-go" monetary policies.

Thus, the traditional arguments about lags and uncertainties suggest that the potential for policy activism to do good is very limited while the potential for doing harm is substantial, and hence they commend a conservative bias in the use of monetary policy. This conservative bias is reinforced by the arguments concerning expectations and credibility. A discretionary policy regime provides no firm basis for markets to anticipate future monetary policy, and it thus leaves the economy vulnerable to destabilizing waves of speculation about what the Bank will do in the future. As a result, the potential for destabilizing effects of policy and the lack of an anchor for policy and expectations in the medium term make a discretionary policy regime undesirable.

Simple Policy Rules

An alternative operating mode that attempts to overcome these problems with discretionary policy is a simple policy rule. It should be emphasized that what is meant here is a predetermined rule for the setting of the Bank's key policy instruments, with no allowance in the rule for altering the instrument in response to developments in the economy.

Simple policy rules are usually identified with monetarists who advocate that the central bank monitor and control the rate of growth of the money supply and that it not alter this growth rate in response to developments in the economy. Such a policy clearly avoids the problems posed by lags and uncertainties. On the surface, it also deals with the expectations issue — that is, such a rule would appear to give a firm basis on which market participants can form expectations about future monetary policy.

The problem with this mode is that it fails to recognize the importance of changes and surprises in the economy other than those associated with the effects of monetary policy, and thus it allows no flexibility to take advantage of the potential power of monetary policy. For example, the blind pursuit of a money-growth rule in the aftermath of the October 1987 stock market crash clearly would have exacerbated an already-serious situation; as it was, the quick response of central banks in providing liquidity to the financial system minimized the effects of the crisis without apparently destabilizing expectations about the future course of policy. A second, less dramatic, but highly instructive example occurred as the result of the success of monetary policies in reducing inflation earlier in the decade. Falling interest rates and the recovery in output and employment created a surge in the demand for money. Many monetarists argued that the resulting rapid growth rates in the money supply were bound to fuel inflation. It now seems clear, however, that a narrowly pursued money-growth rule that did not recognize the changing circumstances would probably have choked off the recovery that was under way. The noninflationary increase in the money supply during this "re-entry problem" was made possible by the earlier success at disinflating.

It is ironic that while some of the motivation for policy rules is to provide credibility, a central bank ultimately will lose credibility if it tries to stick to a rule that has become clearly undesirable and eventually has to be abandoned. Thus, these arguments suggest that a simple policy rule that ignores developments in the economy can often lead to poor policy and will, in all likelihood, eventually have to be abandoned.

Contingent Policy Rules

A third possible operating mode is the intermediate case of a contingent policy rule, whereby the Bank identifies clear policy objectives and its intended means of attaining them while also making explicit allowance for responding to developments in the economy. In such a mode, the policy objectives are clearly medium-term ones — that is, they are goals to be achieved over a period of, say, five years. The responses that the Bank makes to developments in the economy are short-term ones — that is, unanticipated developments such as a burst of inflation, a run on the currency, or a stock market crash, might cause the Bank to depart from its stated policy path for a period of weeks or even months.

Thus, under this operating mode, current policy is contingent but the ultimate policy goal itself is fixed. In principle, such a policy provides the best of both worlds: the commitment to a rule provides discipline on central bank operations that discourages procyclical policies, cumulative error, and destabilizing speculation about future policy; the allowance for contingencies provides flexibility to respond to major developments. Thus, contingent rules appears to be an ideal policy that can "prevent" some problems from arising, while preserving the freedom to "react" in the short term to some uncontrollable ones that do arise.

It is useful to note one important difference between simple and contingent rules, as the terms are used here. Simple rules are generally stated in terms of the policies themselves — a widely used example is the monetarist rule of controlling the rate of growth of the money supply. Contingent rules are stated in terms of objectives, while the contingencies are stated in terms of reactions of policies to events. Whether a contingent rule also commits the Bank to a target path of a particular policy variable — a so-called "intermediate target" such as a monetary aggregate or nominal income — is a tactical decision made in the context of the broad strategy of pursuing the medium-term objective. Pursuing a contingent rule neither commits nor precludes the use of such an intermediate target.

In practice, the trick in using a contingent rule is, of course, to react to short-term developments in such a way as to minimize any conflict with the medium-term goal and to avoid creating any impression that the medium-term goal has been abandoned.

The Role of the Exchange Rate

In principle, the exchange rate plays no special role in the approach to monetary policy advocated in this essay. However, given the profile that the exchange rate gets in public policy debates and in the press, it is perhaps useful to elaborate on its role.

For the most part, the exchange rate is simply one more variable that the Bank of Canada monitors in assessing developments in the economy and the results of its own policies. Thus, in the transition to price stability, the market value of the Canadian dollar should be permitted to fluctuate freely. As with other variables, however, the Bank should reserve the discretionary power to react to short-term developments that threaten its ability to pursue its long-term objectives or that threaten to disrupt unduly the functioning of the economy. Typically, this would involve temporary interventions in response to developments in the exchange market, where speculative activity is rife; the run on the Canadian dollar in January 1986 is a vivid example of an instance where forceful intervention was not only necessary but also served to reinforce the Bank's long-term credibility.

One issue that often arises is the implicit association of the term "exchange rate" with the value of the Canadian dollar compared with that of the U.S. dollar. While it is true that the vast majority of Canadian trade is with the United States, there are good reasons for measuring the exchange rate in terms of a broader mix of currencies. First, in the past ten years, the U.S. dollar itself has exhibited great instability, so that variations in the Canada-U.S. rate can give very misleading information about the "average" external value of the Canadian dollar. Second, Canadian exports to the U.S. market compete with those from Europe, Japan, and other producers, so that even if the Canadian-U.S. dollar rate remained stable, Canada's ability to compete with those other producers might change sharply. Recently, in its public statements and its published statistics, the Bank has ceased its exclusive focus on the U.S. dollar exchange rate and has begun to monitor more closely the broad G-10 (Group-of-Ten) rate.

A second issue that warrants attention is the apparent tradeoff between the interest rate and the exchange rate — the Bank is often perceived as choosing between high interest rates and a lower external value of the currency. However, any tradeoff that the market offers is inherently a short-term one, conditioned in particular on expectations of future monetary policy. Monetary mismanagement — monetary policy that contributes to increased expectations of inflation — can create high interest rates and a lower external value of the currency; both reflect the undesirability of a currency subject to inflationary pressures. The good news resulting from the lack of a permanent tradeoff is that it is possible to do better on both scores: credible anti-inflationary monetary policy can lead to both lower interest rates and a high external value of the currency; in this case, both reflect the desirability of a currency issued by a credible, noninflationary central bank.

A third issue concerning the exchange rate is the role it plays in influencing a country's competitiveness. While fluctuations in exchange rates can exert short-term influences on competitiveness, those effects are eliminated over the long term when domestic wages and prices adjust. Furthermore, any attempt to exploit the short-term competitive advantages of an undervalued currency will likely meet with hostile reaction from trading partners, and could trigger a round of "competitive devaluations" that in the end serve only to increase world inflation. For these reasons, the Bank should not adopt competitiveness as a target for monetary policy, although its concern over the effects of an overvalued currency for a protracted period might well influence its de-cisions about a short-term intervention strategy.

Monetary Policy and the Target Inflation Rate

This section examines the Bank of Canada's stated goal of achieving "price stability" over the next few years. The discussion in the previous two sections leads quite clearly to the conclusion that the objective of monetary policy should be to control the trend rate of inflation; the Bank's focus on medium-term developments in the inflation rate is appropriate. However, to make the case that the appropriate long-term goal should be to further reduce inflation requires arguing that the "optimal" inflation rate is less than the current rate and that it is worth bearing the transition costs of moving to that lower rate. In my view, however, price stability, rather than zero inflation, should be the Bank's appropriate goal, for reasons discussed below.

Zero Inflation versus Price Stability

As Peter Howitt argues elsewhere in this volume, a number of theoretical arguments suggest that the "optimal" inflation rate is probably pretty close to zero. This is because inflation distorts market signals, taxation incidence, and the distribution of income and wealth, thus hindering the allocative efficiency and productive capacity of the economy. It creates uncertainty such that decisions and plans for economic activity may be based on incorrect information or simply not implemented. These negative effects remain strong at inflation levels of 4 to 5 percent, and accelerate quickly when inflation rises above those levels. (It should be noted in this context that the recent reform of the Canadian tax system did not include reforms, such as indexation, that serve to minimize the inflationary distortions caused by the tax system.)

Zero is the rate that minimizes the above distortions; Howitt also identifies arguments in favor of both a negative inflation rate (shoe-leather costs) and a positive inflation rate (inflation as a source of tax revenues, although considerations of distortions suggest that the marginal cost per dollar of revenue from the inflation tax exceeds one for relevant ranges of the tax). He argues that the effects are relatively small and tend to cancel each other out. In light of the Canadian experience of the 1980s, however, where a prolonged period of relatively high levels of unemployment did not succeed in reducing inflation below the 4 to 5 percent range, Howitt feels that the cost of getting to zero is too high, and that the optimal target is above zero although still below the current rate.

I would thus suggest that an explicit target of zero is inappropriate, and that this is reinforced by the credibility problems that the certain failure to achieve zero inflation in any precise sense will create. The Bank should therefore disavow any explicit zero-inflation target and instead promote its goal of price stability in the sense of pursuing a steady, gradual reduction in the inflation rate from its current range. While zero inflation may not be optimal, neither is permitting inflation to stabilize in its current 4 to 5 percent range.

In pursuing a reduction in inflation from its present range, the benefits in terms of the economic and social advantages of price stability might not outweigh the inevitable short-term output and employment costs by as much as when the initial situation is one of double-digit inflation — such as prevailed at the start of the decade. Nevertheless, the long-term benefits are substantial — recall that, viewed in a longer-term perspective, a 4 percent inflation rate is well above average. Further, the short-term costs can be minimized by policies to make the disinflation as credible as possible.

A more subtle argument is that accepting the current inflation rate would be bad for policy credibility. Canadians paid a high cost in foregone output and high unemployment in order to reduce inflation from the double-digit levels that prevailed at the start of the 1980s. One side effect of this policy success was the enhancement of the credibility of the Bank's joint commitment to low inflation. This enhanced credibility now provides an opportunity for the Bank to achieve further reductions in inflation at much smaller economic and social costs. It would be extremely unfortunate if the Bank did not take advantage of this opportunity. It would be equally unfortunate if the Bank did not receive the full support of the government in pursuing further reductions in the inflation rate.

The authorities' implicit or explicit acceptance of a 4 or 5 percent inflation rate would leave open the possibility of their accepting of "minor" increases in that rate and invite expectations of a "creeping" inflation rate. As Governor Crow has argued repeatedly since his appointment, in the absence of a strong anti-inflation stance by the Bank, the recent strength of the economy would cause inflation to rise; recent information on wage settlements and price indexes has confirmed his fears. If such an increase in inflation is allowed to continue, then the beneficial side effects of the earlier disinflation would be thrown away. Rising inflationary expectations would serve to exacerbate the inflationary pressures in the economy, and once those expectations get entrenched they would reduce the Bank's credibility in the anti-inflation arena. When inflation gets large enough that the political will is again able to countenance a sharp disinflationary policy — as it eventually would — a much larger cost in terms of output and unemployment would again have to be paid.

The strong conclusion from this line of reasoning is that it would be better to maintain vigilance on the inflation front now than to subject the economy to another inflation-disinflation cycle. I further believe that vigilance is best maintained by a continual, gradual attempt to further reduce the inflation rate below its current 4 to 5 percent range. Is this conclusion strong enough, however, to provide a defense for the current stance of Canadian monetary policy?

The Current Stance of Monetary Policy

The discussion in the previous sections leads to the perspective that the Bank of Canada has a defensible policy in terms of reducing the inflation rate over the medium term, and that this policy is currently in conflict with relatively strong, although unevenly distributed, demand forces in the economy. A number of criticisms of Bank policy need to be aired. However, all accept, I believe, the need for long-term inflation vigilance, and all involve concerns about the current values of the exchange rate and interest rates.

The Monetary-Fiscal Mix

A number of critics of current monetary policy have focused on the mix of monetary and fiscal policy. For a number of years now, macroeconomists of a wide variety of stripes have called for a change in the mix in both the United States and in Canada — that is, fiscal policy needs to be tighter, and monetary policy needs to be looser. But the key to attaining that mix is that the fiscal change has to come first — the persistence of huge deficits is widely perceived to constrain the monetary authorities' ability to loosen. Any monetary loosening not accompanied by deficit reduction would be destabilizing for inflation expectations and probably for financial markets in general.

This perspective raises a number of questions. For example, is there the possibility of a "virtuous circle" arising out of a credible deficit-reduction fiscal strategy? Fiscal contraction might give rise not only to a reduction in real interest rates, but possibly also to a larger reduction in nominal rates; it is possible that the spread between the two might fall if the threat of "monetization" of deficits — and hence expectations of future inflation — were reduced. Alternatively, would the persistence of large budget deficits and a continually rising debt-to-GDP ratio eventually undermine any attempt by the Bank to pursue a long-term objective of price stability? The very fact that this question can be, and often is, posed casts doubt on the credibility of the Bank's price-stability objective and serves to undermine its intended effects.

Some commentators have recently argued that most of the fiscal correction is now in place, and that the Bank has room to loosen monetary policy.[6] However, the case that fiscal policy is now "on track" is not easily made. Neil Bruce and I have recently argued that the budget projections predicting a stabilizing of the debt-to-GDP ratio over the next five years are themselves not very credible and that, until there is more progress in cutting the level of program spending, concerns about future deficits will continue to haunt policymakers.[7] For example, I would attribute some of the current political resistance to the government's initiative on the Goods and Services Tax (GST) to be due to the lack of progress in cutting spending; some of those who might otherwise have supported the GST as part of a broader tax reform package are now denouncing it as a "revenue grab." Further, while critics of the Bank seem willing to attribute the current high levels of real interest rates and the strength of the Canadian dollar to tight monetary policy, current and anticipated fiscal stimulus can also give rise to the same outcomes. My own feeling is that there has not been sufficient fiscal correction to create much room for the Bank to maneuver.

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[6] See, for example, Pierre Fortin, "Improving Canadian Macropolicy: The Lessons of Thatcher, Greenspan, and McDougall" (paper presented to the Moneco-Econtro Conference, Kingston, Ont., August 30, 1989).

[7] Neil Bruce and Douglas D. Purvis, "Implementing a Prudent Fiscal Strategy over the Medium Term," in Jack M. Mintz and Douglas D. Purvis, eds., *Policy Forum on Macropolicy Issues in the Medium Term* (Kingston, Ont.: John Deutsch Institute for the Study of Economic Policy, 1989), pp. 28-46.

An alternative is the "debt-overhang view," which holds that, given the cumulated national debt due to the persistent deficits of the past decade, tight monetary policy is counterproductive since it raises the interest on the debt and thus contributes to fiscal deficits. Bruce and I have argued that, for long-term fiscal prudence, only the trend, real interest payments on the debt matter; temporary increases in real interest payments arising from an anti-inflationary monetary policy do not undermine fiscal prudence.[8] From the perspective of short-term stabilization, the argument seems to be: given that Canada has large deficits and debt, monetary policy needs to be loose, and only when fiscal policy tightens is it possible to afford tight monetary policy. This call for "policy harmonization" is a throwback to the pre-Accord, post-World War II period, when the U.S. Treasury held that a key role for monetary policy was to provide low-interest finance for government debt. This has long been recognized as a recipe for financial instability, and I see nothing in the current situation to suggest that there is newfound merit in these discredited views.

There is a silver lining to the debt-overhang cloud, which warrants further discussion. The debt overhang mitigates the fear that the focus on the government deficit invites procyclical fiscal policy: if the deficit becomes a target of Bank policy, it might repeat the mistakes of the 1930s and introduce fiscal contraction in the face of a downturn in the economy. The debt overhang means that this risk depends on the source of the downturn. If it is due to a cyclical downturn in spending, then interest rates will fall; the debt overhang means that the fall in interest rates will have a large "beneficial" effect on the deficit that will offset or perhaps even reverse the traditional cyclical effect on revenues. If, however, the downturn occurs in response to monetary disinflation, interest rates will rise and the debt overhang effect on the deficit will reinforce the traditional effect. This is where the current situation seems to me to carry real dangers, and it reinforces the need to focus on the monetary-fiscal mix.

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[8] Neil Bruce and Douglas D. Purvis, "Consequences of Government Deficits," in John Sargent, ed., *Fiscal and Monetary Policy*, Royal Commission on the Economic Union and Development Prospects for Canada Collected Research Studies 21 (Toronto: University of Toronto Press, 1985), pp. 43–84.

Regional Disparities

A second source of criticism of the Bank of Canada, closely related to the earlier discussion on exchange rates, is the Bank's apparent indifference to the enormous regional disparities in the Canadian economy.

The Bank's response, which at one level is unassailable and accepted by all but the most unsophisticated critics, is that monetary policy is too blunt an instrument to be effective in addressing regional issues — that the effects of monetary policy operate at the aggregate level and cannot be focused on particular regions. Of course, regions can differ in their economic situation, but monetary policy is completely ineffective as an instrument for altering their long-term relative prosperity. Any attempt to use monetary policy to offset differences in regional income levels or unemployment rates ultimately will affect only the national inflation rate.

This is the major reason for rejecting the cries for "lower, made-in-Canada interest rates" that emanated from the First Ministers' Conference in August 1988. The policy that the Premiers proposed was based on an untenable view of the reaction of the market to monetary stimulus; as argued earlier, it would quickly lead to increased inflationary pressures and, consequently, to higher interest rates, throughout the economy. The Premiers may have been right in their assessment that inflationary pressures are low in many regions, but the policy they recommended would have quickly created some!

R.F. Lucas puts forward a more serious variant of the regional-disparities criticism.[9] He accepts the above response in terms of long-term effects but nevertheless criticizes the Bank's timing. The argument is that the costs of disinflation are disproportionately high in those regions not enjoying the boom that Central Canada has been experiencing. While this argument may have some effect on the strength with which the Bank pursues its medium-term target, it should not alter the basic thrust of Bank policy.

A final, more sophisticated, variant of the regional-disparities criticism is essentially an extension of the "hysteresis" arguments of U.S. economist Paul Krugman about the long-term effect on the United States of the period of overvaluation of the U.S. dollar in the mid-1980s.[10] Tom Courchene, for example, has argued in a Canadian context that the combination of high real interest rates and an overvalued Canadian dollar is essentially permanently altering the structure of the Canadian economy, reducing the ability of the regions to develop industrial diversification.[11] This is a challenging view. Again, it does not present a compelling case against the medium-term goal of inflation reduction, but it does question the speed with which that goal should be pursued. However, it is also as much an argument against fiscal ease as it is an argument against monetary restraint. And, I would suggest, it loses much of its impact when one recognizes that the recent configuration of a high real exchange rate and high real interest rates largely reflects an underlying demand boom in the Canadian economy.

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[9] See Lucas, "The Bank of Canada and Zero Inflation."

[10] See Paul Krugman, *Exchange Rate Instability*, the 1988 Robbins Lectures (Cambridge, Mass.: MIT Press, 1989).

[11] See Courchene, *No Place to Stand?*

Preserving the Gains from the Free Trade Agreement

A final criticism of current Bank policy is that the combination of high real interest rates and a high real exchange rate adversely affects those industries exposed to international trade. These high rates thus serve to undo the benefits of the Canada-U.S. Free Trade Agreement and ultimately to undermine support for the Agreement. This is an important issue and, if true, it would considerably raise the costs associated with the current stance of monetary policy. However, as with other criticisms raised above, it is not clear that the entire responsibility for the current interest rates and exchange rate rests entirely on the shoulders of monetary policy.

In any event, despite continued concern about high real interest rates and the strength of the Canadian dollar, economic growth and inflationary pressures remain strong, and unemployment remains relatively low. It appears that Canada has been experiencing a substantial demand boom fuelled, I would argue, largely by an investment boom induced by the opportunities and expectations created by the Free Trade Agreement. This investment is not focused entirely, or even disproportionately, in Central Canada; Saskatchewan and New Brunswick are currently the two fastest-growing provinces. The high exchange rate and interest rates may serve to mitigate this boom, but it seems unlikely that they would reverse the benefits in exactly those industries where the investment is focused. More likely, they will serve to hasten the unwinding of "sunset" industries whose decline — though reflecting improved resource allocation — will, in the political calculus, be included as part of the Agreement's costs.

A Fixed Exchange-Rate Alternative?

One argument about Bank of Canada policy starts from the proposition, first suggested by Robert Mundell and J.M. Fleming,[12] that monetary policy is effective in a small open economy operating under flexible exchange rates, augmented by the recent evidence that it has excessive effects on the real exchange rate. The notion is that in a small open economy — that is, Canada — closely tied to a large trading partner — the United States — monetary policy that is "out of phase" will lead to excessive fluctuations in the exchange rate, not only disrupting trade and investment but eventually leading to a risk premium on Canadian exchange rates.

This argument is sometimes heard in connection with the Free Trade Agreement, the concern being that the induced rise in the cost of capital in Canada is undermining the potential gains that could accrue due to the Agreement. The suggested alternative is for the Bank to forsake independent monetary policy and simply fix the Canada-U.S. exchange rate. This supposedly would take the exchange-rate risk out of Canadian interest rates, restore the cost of capital in Canada to levels consistent with those in the United States, and ensure that the potential gains from the Agreement are achieved.

I am not persuaded by this fixed-exchange-rate proposal, for several reasons.

First, the obvious question is: At what level should the exchange rate be fixed? I suspect it might be hard to get much agreement on this from those who favor fixed rates.

Second, over the past decade the Canadian dollar has been one of the most stable of currencies in terms of its external value, whether measured against the U.S. dollar or a broader basket of currencies. The case that current Canadian interest rates are high because of the sudden emergence of a large risk premium has yet to be made.

Third, in terms of the zero-inflation target, this would amount to the Bank of Canada's deciding that the U.S. Federal

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[12] See J.M. Fleming, "Domestic Financial Policies under Fixed and under Floating Exchange Rates," *International Monetary Fund Staff Papers* 9 (1962): 369-379; and R.A. Mundell, "Capital Mobility and Stabilization Policy under Fixed and Flexible Exchange Rates," *Canadian Journal of Economics and Political Science* 29 (1963): 475-485.

Reserve's progress toward its zero-inflation goal is good enough for Canada. While this may look attractive to some people at this particular juncture, it is not clear that the historical record in the United States inspires the kind of confidence required to make this argument compelling. Certainly, it is hard to argue by analogy to the need for Italy and France to "import credibility" from the Bundesbank that makes the European monetary arrangements feasible. Further, I think the very real prospects for a sharp depreciation of the U.S. dollar in the near future make this a particularly inappropriate time to commit to a fixed Canada-U.S. exchange rate.

Fourth, what are the implications for fiscal policy? Does fixing the exchange rate make financing deficits easier, at least in the short term, and thus reduce the discipline that financial markets can impose on fiscal policy? Certainly, this is a view that is widely held; if it has merit, then for those who share my concern about the current and prospective stance of fiscal policy, the fixed exchange-rate option looks very unappealing.

Pursuing Price Stability

The twin keys to achieving price stability are, first, disciplined vigilance in reducing the trend rate of inflation and, second, a flexible approach to responding to selected short-term developments. The difficult aspect of this strategy is to prevent reactions to short-term developments from compromising the longer-term objective; credibility is affected more by policy actions and results than it is by announcements. A number of principles can be invoked to help preserve both the credibility of the Bank of Canada's policy and its short-term flexibility.

The Bank should explicitly identify its long-term objective.

A clearly announced, unambiguous policy objective should serve as a complement to the Bank's actual policies, provided that the policies themselves are such as to preserve the credibility of the announced objective. Of course, announcements themselves will have little effect unless they are supported by policy actions and, eventually, policy results; only persistent policies consistent with the long-term objective and maintained over a sustained period will make the announcements credible. The evolution of credibility through announcements and policy results will reduce the output losses necessary to attain price stability and reduce the time required for that goal to be achieved, while preserving the Bank's flexibility to react to short-term developments.

The Bank has clearly tried to achieve this principle, and there is some evidence that it has enhanced its credibility by doing so. However, the arguments above suggest that the confusion about the zero-inflation target will serve to undermine the Bank's credibility; a firm commitment to gradual disinflation without any commitment to achieve or sustain zero inflation would better serve the Bank's long-term interests.

Both the Bank's announcements and its policy actions should emphasize that price stability, as defined above, is a long-term objective. Its policies and public announcements should also allow for the possibility that short-term developments beyond the Bank's control can cause measured inflation to increase temporarily. Further, the Bank should make clear that, given the current state of the economy and the recent history of inflation, a dramatic monetary deceleration with the associated large output costs is neither necessary nor desirable. If progress is to be made in promoting policy credibility, a determined but gradual approach is optimal.

The Bank should, as far as possible, explicitly identify those contingencies to which it will react.

In addition to announcing its long-term objectives, the Bank should also be as explicit as possible in indicating in advance what types of contingencies it will and will not react to in the short term, and in giving the rationale for such possible uses of discretionary power.

For example, the Bank should emphasize the limited role for monetary policy to target on and/or react to real variables such as real GDP and the unemployment rate. As I have stressed, the Bank can expect to exert virtually no influence over these variables in the medium term, and its short-term influence is so imperfect as to make monetary policy virtually useless as a stabilizing force. Note that this means, for example, that the current debate about identifying the "correct" value for the natural rate of unemployment is virtually irrelevant for determining the correct stance of monetary policy. Whatever the natural rate of unemployment is, the Bank cannot influence it, and the most constructive way for the Bank to assist the economy to achieve the natural rate quickly is to provide a stable, predictable monetary environment.

The Bank should also stress that it will continue to perform its "lender of last resort" function. The Bank's timely and effective response in providing sufficient liquidity to the financial system in the aftermath of the October 1987 stock market crash is testimony to the need for such power, and subsequent developments demonstrate that such deviations, if temporary, need have no permanent or damaging implications for the Bank's credibility. Indeed, in a historical perspective, the October episode appears to have improved its credibility, as reflected by the facility with which it dealt with the October 1989 crisis.

Should the Bank decide to allow monetary policy temporarily to loosen relative to the path consistent with its long-term price stability, its actions should be governed by the twin principles of maintaining the emphasis on the long term while allowing for short-term flexibility. This would involve the Bank's announcing its intention for this monetary relaxation to be a "one-off" event, the estimated period for which the relaxation will occur, and the rationale behind it — probably stressing its desire to avoid persistent output losses. The commitment to a medium-term policy objective could, in fact, aid such short-term policy reactions to undesirable developments: a firm commitment to price stability would help agents to assess the probable policy response to these developments and to any subsequent readjustment to monetary target growth rates if deviations have been necessary. The most obvious test case for this is the anticipated introduction of the GST in January 1991.

Since the goal is to reduce the trend rate of inflation, it is important that the Bank distinguish temporary price developments from changes in the underlying trend. The introduction of the GST would cause a temporary blip in measured inflation, and could have some pass-through to wages. This would not, however, signify a change in the underlying trend rate of inflation in the economy, or warrant a dramatic response by the Bank. Both the Bank and the federal government could ease Canadians' concerns by giving notice in advance that inflation will rise in 1991. They should also announce a target for, say, the July 1992 inflation rate — which would involve a beginning and ending period that includes the GST — that would be as low as the July 1990 rate — which would involve a beginning and ending period that excludes the GST.

The Bank should, as much as possible, separate debate about its broad strategy from debate about its operating tactics.

Changes in the Bank's operating environment — due, say, to international developments or deregulation of domestic financial institutions — may on occasion cause changes in the operating procedures that the Bank uses in pursuit of the strategy indicated above. But these should not cause departures from the medium-term objective of price stability, nor should they create any perception that the long-term goal has been abandoned.

Recently, Governor Crow has repeatedly stressed that financial deregulation and globalization of financial services will have no effect on the Bank's ability to control monetary growth. Indeed, uniformity of reserve requirements — zero for all institutions — should help quash some sources of monetary instability.

In a similar vein, the issue of whether the Bank should adopt an intermediate target — for example, to return to its earlier practice of explicitly targeting growth rates for a particular monetary aggregate, or to take up the recently popular proposal of targeting the growth rate of nominal income — is a tactical decision. Some people argue that if the Bank is confident that recent developments will not hinder its control powers, it should target its preferred aggregate at a rate consistent with long-term price stability. At present, the argument runs, the lack of targeting information inhibits agents' ability to monitor Bank progress and may, in a buoyant economy, provoke inflation expectations and uncertainty. Others argue that, in a world with volatile interest rates and rapid financial innovation, rates of growth of any monetary aggregate consistent with long-term price stability will have to be changed so frequently that the intermediate target will serve only to discredit the monetary authority.

Finally, as part of its operating tactics, the Bank might also "look at everything" by monitoring regularly available data on GDP components and other indicators in a progressive learning process to help identify the danger signs of inflation and recession. Monitoring of multiple indicators does not imply, however, that monitoring of multiple variables is desirable.

Conclusions

While there is room for disagreement about details and tactics, the arguments put forward in this essay amount to an implicit endorsement of the broad thrust of the Bank of Canada's current policies.

Perhaps the major point of contention with the Bank's current position concerns its focus on zero inflation as an explicit goal. For reasons indicated above, the theoretical justification for this goal is tenuous. But, more important, the risk to the Bank's credibility posed by identifying such an explicit target is not a good gamble. The Bank would be better advised to put its efforts into placing the current 4 percent inflation in historical perspective, and thus building a consensus for continuing vigilance in the fight against creeping inflation and for gradually reducing the underlying inflation rate. Whether we get to 2.5 percent or only to 3.5 percent over the coming year is not a fundamentally important difference; what is important is that we not get back to 6 or 7 percent.

It would also be beneficial if the Bank could downplay the emphasis given in the public debate to short-term developments in the exchange rate — especially the bilateral rate with the United States — and in interest rates. Most of the short-term fluctuations in these variables convey little or no information about the underlying trends in the economy or about changes in the Bank's intentions. The market tends to magnify the importance of any "news" that arises — for example, releases of key monthly statistics — and to scrutinize the Bank's reactions closely. The Bank should, however, be careful to avoid the trap of rationalizing the market's views; as the message becomes clear that the Bank is not going to react to every minor ripple, market reactions to the "news" would stabilize. It is in this context that the Bank's publicly announced and defended medium-term goals become particularly useful. The Bank no doubt agrees with this in principle; the real question is: How?

In previous periods, the Bank of Canada and central banks in other western industrialized economies have attempted to "finesse" this issue by describing their policy goals and procedures in terms of targets for monetary aggregates. Indeed, the Bank has indicated that it may start to give renewed emphasis to the behavior of monetary aggregates. However, with the current pace of change in financial markets and institutions — the advent of zero reserves, the continued deregulation of deposit-taking institutions, the continued globalization of financial markets, and so on — it seems unlikely that a stable and reliable monetary aggregate will emerge that will play a central role in the formation and execution of monetary policy.

To reiterate, in the absence of the emergence of an acceptable monetary aggregate on which to "hang" its policy, the Bank should focus on the following three implementation principles:

- it should explicitly identify its long-term objective;
- it should, as far as possible, explicitly identify those contingencies to which it will react; and
- it should, as much as possible, separate debate about broad strategy from debate about operating tactics.

In this context, the Bank might also continue to identify those other government policies — in particular, deficit reduction — that will contribute to the goal of lower inflation.

In this essay, my "defense" of the Bank's recent behavior is that it has been pursuing a gradual disinflation policy geared to a sensible and well-defined long-term objective. This has involved "leaning against the wind" in the face of a significant demand boom that has been in direct conflict with the Bank's long-term commitment to further disinflation. That conflict has been enhanced by the fact that the demand boom was, especially in its early stages, unevenly distributed across Canada's regions. The conflict has also been enhanced by the lack of progress on spending and deficit control on the part of the federal government.

The appropriate question for the Bank's critics is: What were the alternatives? Would smoothing interest rates and allowing inflation to go from 4 percent to, say, 7 percent have been preferable? I would argue that, unless one is willing to abandon completely the long-term commitment to inflation control, such an alternative would have been distinctly inferior. One does not have to buy the argument that any easing at all would lead to a precipitous drop in the exchange rate to argue nevertheless that the Bank has had little room to maneuver. However, two issues arise that might be interpreted as possibly creating some room.

First, the much-heralded economic downturn that is expected to hit the Canadian economy confronts the Bank with an awkward choice. Should it choose to take the opportunity of increased slack in the economy to achieve its price-stability goal more quickly? To those concerned with the negative impacts on inflation of the imposition of the GST in 1991, this option will appear attractive. Or should it choose to ease off in order to mitigate the downturn? To those who are concerned that the current levels of interest rates and the exchange rate mean that the Bank has overdone it in terms of its anti-inflation stance, or to those who fear that continued concern about the deficit will spur more fiscal tightening as the downturn occurs, the second option will be attractive. If the Bank chooses the latter, and it may be too late to offset the downturn given the lags in the effects of monetary policy noted earlier, the challenge will be to do so in a manner that does not compromise its medium-term commitment to controlling inflation.

Second, the perspective of an investment boom enhanced by the Free Trade Agreement raises the following issue. These developments clearly imply that long-term potential real income in Canada has increased as a result of the Agreement. In turn, this means that any given path of monetary aggregates is now consistent with a lower long-term inflation rate. Alternatively, any given long-term inflation target is now consistent with a higher stock of money balances. This raises the possibility that the Bank can credibly loosen its monetary stance as these real income increases arise. This seems to me to be an important challenge for monetary policy over the next two years; it is a challenge that could be more readily met if the federal government were, in its next budget, to finish the fiscal correction that it has to date only partially achieved.

Zero Inflation as a Long-Term Target for Monetary Policy

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Introduction

Inflation is a rise in the *general* level of prices. It is important to distinguish inflation from an increase in the *particular* price of one item relative to another, the process of which constitutes an important part of society's mechanism for allocating resources among competing uses. Increases in the level of prices tend to impede the resource-allocation process, thereby lowering the productivity of the economic system.

This essay examines the effects of inflation on the economy, and addresses the question of what rate of inflation should be the long-term target of monetary policy. The study compares economies with different rates of inflation, beginning in the next section with the simplest case of a perfectly anticipated inflation under the assumption of perfect indexation and no costs of changing prices. The sections that follow introduce cases involving the complications of imperfect indexation and costs of changing prices, and where the economy might not have had time to adjust fully to the inflation. The essay then investigates the effects of increased uncertainty concerning the rate of inflation, followed by the introduction of dynamic considerations with the question: What happens when the underlying rate of inflation changes? The last section brings the analysis together by addressing the issue of whether or not zero inflation is a reasonable long-term goal for monetary policy.

Inflation in the Perfectly Indexed Economy

In order to deal with complications one at a time, this section first considers a hypothetical economy in which all laws and private contracts are perfectly indexed. That is, instead of contracting to pay a certain sum of money in the future, people contract to pay a certain real sum. Each 1 percent rise in the price level raises the amount of money to be paid by 1 percent. Suppose also that there are no costs of changing prices — menus, catalogues, advertised sale prices, and so on are all freely adjustable at all times.

In this hypothetical economy, suppose that inflation has been proceeding at an unchanged rate for long enough that everyone has come to expect it and has fully adjusted to it. The price level is rising steadily and continuously at the rate of *x* percent per year — and has been doing so for several years — and the value of *x* is common knowledge. Over any interval, some prices will be rising at a rate that is more than *x*, some less. What difference does the size of *x* make to important economic magnitudes? An important special case is that of price stability — that is, *x* equal to zero.

This hypothetical economy serves as an "ideal" benchmark case in which the real consequences of inflation are minimal. Any adverse effects of inflation that showed up here would almost certainly exist, and be more severe, in the actual Canadian economy. More specifically, the example illustrates the idea of inflation neutrality.[1]

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[1] Inflation neutrality is more commonly referred to in monetary theory as the "superneutrality of money."

Inflation neutrality is based on the old idea of the neutrality of money: that money is just an accounting device with no intrinsic significance. Wealth is not how much money one has, but how much purchasing power one has measured in terms of real goods and services. When buying groceries, it is not the actual number of ten-dollar bills one must forfeit that is important, but how many days' wages that represents. If there were twice as much money in the economy, but everything cost twice as much, incomes were twice as high, and debts and assets were doubled, then nothing real would have changed.

Inflation neutrality is the same idea, but applied to the rate of change of prices instead of to the level of prices. In this hypothetical economy, with some important exceptions to be discussed below, real economic magnitudes will be independent of the rate of inflation, x. The levels of real output, employment, and income, the rate of growth of output per person, the distribution of income, the array of relative prices, and other real variables depend on the real underlying determinants of technology, endowments of natural resources, the skills, thrift, and industry of the population, laws and social customs, and so forth. Inflation has little influence on these real determinants; therefore, it will not impinge on the allocation of resources. Instead, it will merely alter the number of units of money that must change hands with each transaction.

Three important examples of inflation neutrality are worth mentioning. The first is that of the "natural rate of unemployment." In the long term, there is no meaningful tradeoff between inflation and unemployment.[2] If the economy is in equilibrium with x equal to zero and with a national unemployment rate of 6 percent, then it can also be in equilibrium with x equal to 10 and the same unemployment rate. In the former case, wages will be rising on average at the rate of productivity growth; in the latter, they will be rising at this rate plus 10 percent. In either case, real wages will be following the same path. People's decisions to enter the labor force, to search, to accept or reject a job offer, or to quit their present job, and firms' decisions to recruit, hire, or lay off workers need not be different between the two situations. In either case, the same factors of search and hiring costs, sectoral shifts in demand and technology, the rise and decline of particular enterprises, and the structure of unemployment insurance and other government programs will determine the rate of unemployment.

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[2] See Edmund S. Phelps, "Phillips Curves, Expectations of Inflation and Optimal Unemployment over Time," *Economica* 34 (August 1967): 254–281; and Milton Friedman, "The Role of Monetary Policy," *American Economic Review* 58 (March 1968): 1–17.

Edmund Phelps and Milton Friedman, in the two studies cited above, argue that there would be a unique, "natural" rate of unemployment in the long term, which is independent of the value of x. The uniqueness of the natural rate has been challenged recently on theoretical and empirical grounds.[3] However, even if the real underlying factors do not determine a unique, natural rate, the above considerations imply that the set of possible natural rates is the same when x equals zero as when it equals 10, or any other number. In the ideal economy presented here, there is no reason, therefore, to think that the choice of x will affect the rate of unemployment.[4] This applies not just to the national average rate of unemployment but also to the regional and sectoral distribution of unemployment, which will also depend on underlying real factors, including the mobility of labor and the regional policies of the federal government, not on the rate of inflation.

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[3] For the theoretical challenge, see Peter A. Diamond, "Aggregate Demand Management in Search Equilibrium," *Journal of Political Economy* 90 (1982): 881–899. For the challenge on empirical grounds, see Olivier J. Blanchard and Lawrence H. Summers, "Hysteresis and the European Unemployment Problem," in Stanley Fischer, ed., *NBER Macroeconomics Annual 1986* (Cambridge, Mass.: MIT Press, 1986).

[4] However, the possible indeterminacy of the natural rate will turn out to have important consequences when the dynamics of changing the rate of inflation are considered in a later section.

The second example of inflation neutrality is the effect on the rate of depreciation of the Canadian dollar on foreign exchange markets. According to the doctrine of Purchasing Power Parity, the rate of depreciation of the dollar will equal the difference between the Canadian and foreign rates of inflation. This is because, in the long term, the internal value of the dollar (the reciprocal of the price level) must equal the external value (the exchange rate divided by the foreign price level). Therefore, the rate at which the external value decreases (the rate of depreciation plus the foreign rate of inflation) must equal the rate at which the internal value decreases (the Canadian rate of inflation).

Purchasing Power Parity implies that a larger value of *x* will coincide with a larger rate of depreciation, point for point. In particular, it implies that inflation will not reduce the competitiveness of Canadian goods on world markets, because the rise in Canadian dollar prices will be just offset by the fall in the exchange rate. More generally, it implies that, in the long term, Canada's rate of inflation need not be constrained by the rate of inflation elsewhere in the world, provided that the exchange rate is allowed to adjust as required.[5]

The third example of inflation neutrality is the effect of inflation on interest rates. In this fully indexed economy, the interest and principle on all debt contracts would be indexed to *x*. Suppose, for example, that *x* was zero and the rate of interest was 4 percent. Consider a bond with a current market value of $1,000, which promised to pay $40 per year for three years and a final payment of the principal value of $1,000 after the third year. Then if *x* were instead equal to 10, the same bond would pay $44 interest after the first year, $48.40 after the second, and $53.24 after the third. The principal would also be adjusted every year, so that after the third year the amount to be repaid would be $1,331. The real interest rate would still be 4 percent, because the real value of each interest or principal payment has been left unchanged. But the nominal rate of interest, the rate at which a dollar invested grows, would have gone up from 4 to 14 percent — that is, by the increase in the rate of inflation.

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[5] This is true even if capital flows are taken into account. For example, if capital flows require a given real imbalance in Canada's current account, the real imbalance will be unaffected by inflation, and the currency depreciation will be just sufficient to offset the effect of inflation on international capital payments, through a Fisher effect.

The positive effect of inflation on the nominal rate of interest is called the "Fisher effect."[6] If inflation is neutral, it will occur on unindexed as well as on indexed debt. If x were 10, someone who was going to issue the bond in the example above might instead issue one that promised to pay $140 each year in interest, in addition to the $1,000 principal after three years. The nominal rate would be 14 percent, and the real rate, which could be calculated by subtracting x from the nominal rate, would remain at 4 percent. In this way, the nominal interest rate could fully incorporate the expectation of inflation.

As we shall see, however, this example of inflation neutrality probably does not apply to the actual Canadian economy, where there is evidence of less than a full Fisher effect. Nevertheless, the distinction between nominal and real interest rates is important. Specifically, when x is positive, the nominal interest rate overstates the true cost of borrowing by an amount equal to x. When x equals 10, conventional accounting practice would identify the annual cost of borrowing under the unindexed contract of the previous paragraph to be the full $140 of nominal interest payments. But that ignores the benefit that inflation has conferred on the borrower by reducing the real value of the debt. The gain to the borrower is $100 — x percent of the debt. Thus, of the $140 in nominal interest costs, $100 is an illusory cost. The borrower must pay that $100, but is fully compensated for it by the erosion of the real value of the debt through inflation. The failure of conventional accounting practices to distinguish between real and illusory costs underlies many of the costs of inflation in Canada.

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[6] The reference is to Irving Fisher, "Appreciation and Interest," *Publications of the American Economic Association*, third series, 2 (August 1896): 331–442. It should be noted, however, that Fisher did not in fact believe that the effect would be point for point. He estimated a smaller effect, which he attributed to lack of foresight on the part of lenders.

Furthermore, even if there is not a full Fisher effect, there clearly is at least a partial one — that is, the nominal rate of interest does appear to be positively related to the rate of inflation in the long term. Accordingly, this example of superneutrality stands as a valid warning that, in the long term, high nominal interest rates are a sign of inflationary policies rather than of tight money.

As was mentioned above, there are important exceptions to inflation neutrality that would apply even in this hypothetical economy. This section discusses three that have been much analyzed in the literature.

The first is sometimes known as the "shoe-leather" cost of inflation. The higher is *x* the higher is the nominal rate of interest, through the Fisher effect. But the nominal rate of interest is the opportunity cost of holding noninterest-bearing money — currency plus demand deposits, otherwise known as M1 — because the holder of these assets foregoes all interest, real and nominal. Thus, the larger is *x* the less purchasing power people will be induced to hold in the form of money.

Holding money economizes on transaction costs of various sorts, of which the shoe leather worn out making frequent shopping expeditions is a simple example. Thus, an increase in *x*, by reducing money holdings, will increase transaction costs. As Milton Friedman and others have pointed out, this shoe-leather cost of inflation is a deadweight loss to society.[7] Eliminating the deadweight loss would require *x* to be driven below zero, to the point where the nominal rate of interest was zero. Only at that point would people hold the socially optimal quantity of money — the amount beyond which holding another dollar would yield no further reduction in transaction costs.[8]

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[7] See Milton Friedman, "The Optimum Quantity of Money," in idem, *The Optimum Quantity of Money and Other Essays* (Chicago: Aldine, 1969).

The size of the shoe-leather cost is hard to assess. A narrow interpretation makes it appear numerically insignificant. It is properly measured, under standard assumptions, by the area under the demand curve for noninterest-bearing money, M1.[9] According to one estimate of the demand function for M1 in Canada, the cost thus measured was $555 million in 1988, less than one-tenth of 1 percent of 1988 GNP.[10]

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[8] The conventional analysis of shoe-leather costs treats inflation as a tax on the holding of money, because of the way it reduces the purchasing power of the holder. But, as has been argued in various studies, the shoe-leather cost can be regarded more broadly as a tax on all market transactions. This is because when a person sells *A* and uses the proceeds to buy *B*, money must be held during the interval between sale and purchase. Thus, anything that taxes the holding of money also constitutes an indirect tax on the exchange of *A* for *B*, or on the exchange of *B* for *A*, or on any transaction that involves the use of money. This way of viewing the shoe-leather cost may make it seem more relevant, but does not change the appropriate calculation of the welfare cost. See Jack Leach, "Inflation as a Commodity Tax," *Canadian Journal of Economics* 16 August 1983): 508–516; and Meir Kohn, "In Defense of the Finance Constraint," *Economic Inquiry* 19 (1981): 177–195.

[9] As demonstrated in Martin J. Bailey, "The Welfare Cost of Inflationary Finance," *Journal of Political Economy* 64 (1956): 93–110.

[10] As estimated by Paul M. Boothe and Stephen S. Poloz, "Unstable Money Demand and the Monetary Model of the Exchange Rate," *Canadian Journal of Economics* 21 (November 1988): 785–798. Their equation is:

$$\log M = (0.7873) \log M_{-1} - (0.7342) \log (1 + R) + \text{other terms.}$$

This gives the stationary-state equation:

$$\log M = -(3.4518) \log (1 + R) + \text{other terms.}$$

In mid-1988, R was approximately 0.09 (the rate on 90-day corporate paper, the interest rate in the Boothe-Poloz equation), and M was approximately $38 billion. This yields a measure of "other terms" for 1988, so that:

$$\log M = -(3.4518) \log (1 + R) + 3.9351.$$

Thus, in 1988, the demand function could be written in billions of dollars as:

$$M = (51.1649)(1 + R)^{-3.4518}.$$

The area under this curve between $R = .09$ and $R = 0$ is 0.5546.

There are, however, at least two reasons why this is an underestimate even in the hypothetical fully indexed economy. First, there is a public-good aspect to the holding of money, according to which the social gain from holding more exceeds the private gain.[11] Specifically, anyone who decides to hold more money thereby will make less frequent demands for cash or other liquid assets on other people, thus reducing their need for liquidity.[12]

Second, the effects of inflation are likely to be spread by a chain of substitution going beyond M1 to the holding of all liquid assets, including interest-bearing chequing accounts, savings accounts, and short-term securities, making the real interest rate on all liquid assets a decreasing function of x.[13] Because of this, the shoe-leather cost may be important even in a world where, as appears to be happening, M1 is a shrinking component of the overall financial system.

In the absence of further empirical work, it cannot be said by how much conventional measures underestimate the shoe-leather cost of inflation. Although theoretical economists like to ignore transaction costs, empirical estimates have often found them to be remarkably large. About one-half of measured GNP in the United States, according to one estimate, is actually intermediate output used up in the transactions process.[14]

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[11] See David Laidler, "The Welfare Costs of Inflation in Neoclassical Theory — Some Unsettled Questions," in E. Lundbert, ed., *Inflation Theory and Anti-Inflation Policy* (London: Macmillan, 1978).

[12] For a formal model of such external effects of holding money, see Peter Howitt, "Money and the Timing of Transactions in Intermediated Exchange," in Meir Kohn and S.C. Tsaing, eds., *Finance Constraints, Expectations, and Macroeconomics* (Oxford: Clarendon Press, 1988).

[13] Joel Fried and Peter Howitt, "The Effects of Inflation on Real Interest Rates," *American Economic Review* 73 (December 1983): 968–980.

[14] See John J. Wallis and Douglass C. North, "Measuring the Transaction Sector in the American Economy, 1870–1970," in Stanley Engerman and Robert Gallman, eds., *Long-Term Factors in American Economic Growth* (Chicago: University of Chicago Press, 1986).

Thus, shoe-leather costs are probably much more important empirically than their name suggests, and much more than conventionally measured.

A second possible exception to inflation neutrality is the effect on capital accumulation. According to one theory, there is a positive effect.[15] As was explained above, the larger is *x* the less money people will hold in real terms. Thus, a larger *x* will imply less wealth (money plus capital) at any given level of capital. If people respond to a reduction in wealth by saving more, a larger stock of capital will result in the long term.

This effect is empirically insignificant, because money is only a tiny fraction of aggregate wealth. But there is another effect, which works in the opposite direction, that may be quite important empirically. Specifically, since business enterprises hold cash in order to reduce transaction costs, money can be regarded as a factor of production.[16] Holding more cash allows a firm to use more of its existing labor and capital for production instead of for conducting transactions. The larger is *x* the greater is the opportunity cost of holding money, and thus the less money firms will be induced to hold. Under the reasonable assumption that money and capital are complementary factors of production, less money implies a lower marginal product of capital at any given level of capital.[17] But this implies a lower real rate of interest to savers, which may induce them to save less, resulting ultimately in a lower stock of capital.

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[15] The theory is developed in Robert Mundell, "Inflation and Real Interest," *Journal of Political Economy* 71 (1963): 280–283; and James Tobin, "Money and Economic Growth," *Econometrica* 33 (October 1965): 671–684.

[16] See Stanley Fischer, "Money and the Production Function," *Economic Inquiry* 12 (December 1974): 517–533.

[17] The marginal product of capital is the extra output attainable from using one more unit of capital, together with an unchanged labor input. The after-tax marginal product of capital is what is left to the saver after deducting personal and corporate income tax from the marginal product. In order for savers' portfolios to be in long-term equilibrium, the after-tax marginal product of capital must equal the after-tax rate of interest plus a premium to compensate for the extra riskiness of owning capital and the extra liquidity of bonds.

The third and final exception to inflation neutrality is the fiscal effect. A larger x implies that people must accumulate more money each period just to keep the real value of their holdings constant. The government that creates the extra money is thus able to pay more of its bills through the expedient of the printing press, without resorting to direct taxes or to borrowing from the general public. (Actually, it is the Bank of Canada that creates the money, and the government "borrows" the newly printed money from the Bank by selling it newly issued government bonds.) Thus, inflation appears to the private individual like a tax that must be paid on the holding of money, and to the government it represents a tax that can be collected on the holding of money. The revenues generated by this tax are called "seigniorage."

Therefore, at least up to a point, a larger x allows the government to reduce other taxes or to increase its expenditures. This potential effect is important for determining the optimal long-term rate of inflation. In particular, it has been suggested that the deadweight shoe-leather cost of inflation is, in principle, no different than the distortions attributable to any other tax.[18] Nondistorting lump-sum taxes are nonexistent in the real world. Thus, as long as there is a reason for having any taxes at all, it will generally be optimal to rely at least to some extent on the inflation tax.

However, it would be wrong to regard inflation as "just another form of taxation." Money is an intermediate good whose use confers no direct benefits except through the production of transactions services,[19] and the optimal taxation results[20] imply that it is never efficient to tax intermediate goods. This theoretical argument has been borne out by the empirical estimates of another study,[21] according to which the excess burden of the inflation tax is several times that of the tax on labor income in the United States.[22]

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[18] See Edmund S. Phelps, "Inflation in the Theory of Public Finance," *Swedish Journal of Economics* 75 1973): 67–82.

[19] Miguel Faig, "Optimal Taxation of Money Balances" (Stanford University, Department of Economics, unpublished, 1985).

[20] Peter A. Diamond and James Mirlees, "Optimum Taxation and Public Production," *American Economic Review* 61 (March, June 1971): 8–27, 261–278.

In summary, even in the hypothetical perfectly indexed economy, perfectly foreseen and perfectly anticipated inflation can have important real effects, by raising transaction costs, by impairing the productivity of capital and thus inducing a long-term decline in the capital stock, and by raising revenue, in the form of seigniorage, for the government. These effects all exist, and are even more important, in the actual Canadian economy.

Inflation in Actual Economies with Limited Indexation

This section continues under the assumption that inflation is proceeding at the steady, perfectly foreseen rate of x percent per year, and that the rate has been constant for long enough that the economy has fully adjusted to it. However, it introduces two related real-world complications. First, there are menu costs — that is, many goods and services are offered for sale at advertised nominal prices, and it is costly to change those prices. Second, not all contracts and laws are perfectly indexed. Again the question is: What difference does the value of x make for real economic magnitudes? Not surprisingly, the answer is that these real-world considerations introduce significant departures from inflation neutrality in addition to the three exceptions discussed in the previous section.

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[21] Stanley Fischer, "Toward an Understanding of the Costs of Inflation: II," in Karl Brunner and Allan Meltzer, eds., *The Costs and Consequences of Inflation, Carnegie-Rochester Conference Series on Public Policy* 15 (1981): quoted as reprinted in his *Indexing, Inflation, and Economic Policy* (Cambridge, Mass.: MIT Press, 1987), p. 46.

[22] A very general analysis of the role of inflation in an optimal tax system is presented in Alan Drazen, "The Optimal Rate of Inflation Revisited," *Journal of Monetary Economics* 5 (1979): 231-248.

First, consider menu costs. Their effect is not just to slow down the adjustment of prices but, more importantly, to add a discontinuity to the price of each good. This is because menu costs tend to be of the setup variety. That is, they are discrete costs incurred every time a price is changed, but the size of the cost is independent of the size of the price change. Now, if millions of individual price changes could be coordinated, there would be two possibilities: the changes could be bunched in time, with every price changing simultaneously, or they could be uniformly staggered, with everyone taking turns.[23]

In the former case, inflation would be a discontinuous process, contrary to the assumptions of this section. The larger the average value of inflation the more frequently would price changes occur, and the bigger would be the changes. In the latter case, inflation could be steady at the constant rate x, as the discontinuities in individual prices are smoothed by aggregation over time and over commodities. A larger x would imply that each individual price-setter would change prices more frequently and by a larger amount, which would imply an increase in the dispersion of relative prices.[24]

Given the difficulty of coordinating individual price changes, and since unpredictable changes in relative prices are always taking place that would make some price-setters want to change prices out of turn, neither of these theoretical ideals is probably very close to the truth. There is evidence, however, in support of the prediction of the second model. Specifically, the larger the average rate of inflation the more frequent the change in any set of individual prices, and the greater the cross-sectional dispersion of relative prices.[25] Both of these effects are likely to constitute a deadweight loss to society. More frequent changes use more real resources. More cross-sectional dispersion because of costs of price changes implies a movement away from the ideal situation in which relative-price differences are attributable only to the fundamentals of tastes and technology.

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[23] For an attempt to analyze these possibilities, see Michael Parkin, "The Output Inflation Trade-Off When Prices Are Costly to Change," *Journal of Political Economy* 94 (1986): 200–224.

[24] This case was studied by Eytan Sheshinski and Yoram Weiss, "Inflation and Costs of Price Adjustments," *Review of Economic Studies* 44 (1977): 287–304. It was further analyzed by Jerzy Konieczny, "Inflation and Costly Price Adjustment" (unpublished Ph.D. dissertation, University of Western Ontario, London, Ont., 1987).

An increase in *x* is also likely to create an additional deadweight loss because of the difficulty of coordinating price changes during a time of inflation.[26] Specifically, the typical household is likely to find that the higher *x* is the less information is contained in the price system. Not only does the dispersion of relative prices go up, but the predictability of any individual relative price is likely to go down. If *x* is zero, then an increase in the price of a good is a signal for households to substitute other goods whose relative prices have thereby been reduced. But when *x* is positive, it is harder to tell whether there has been a permanent change in relative prices or whether this is just the occasion for a temporary catchup with the rate of inflation. The larger *x* is the greater the confusion that inflation introduces into the price mechanism at the heart of society's system for allocating resources.

A further effect of menu costs is present if, as some people believe, the costs are greater for price decreases than for increases. Relative prices are changing all the time. The larger *x* is the greater are the number of relative price changes that can be accomplished without a decrease of any nominal price, and the closer will the system track the frictionless ideal of pure economic theory. This effect would tend to make an economy with a slightly positive value of x function more efficiently than one with x equal to zero.

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[25] On the first point see S. Cecchetti, "The Frequency of Price Adjustment: A Study of the News Stand Prices of Magazines, 1959 to 1979," *Journal of Econometrics* 31 (1986): 255-274; on the second point, see R.W. Parks, "Inflation and Relative Price Variability," *Journal of Political Economy* 86 (1978): 79-96.

[26] See Axel Leijonhufrud, "Costs and Consequences of Inflation," in G.C. Harcourt, ed., *The Microeconomic Foundations of Macroeconomics* (London: Macmillan, 1977).

Menu costs apply to wages as well as to prices. It is costly to negotiate new wage agreements, and sometimes that cost manifests itself in the form of strikes and other forms of labor unrest that result in lost output. There may be more resistance to a wage cut at a time of falling prices than there would be to a wage increase that had the same real effect at a time of rising prices. If this is true, then a slightly positive x will generate a smaller natural rate of unemployment because it will imply fewer sub-labor markets in which unemployment is augmented by the resistance to nominal wage cuts.

It is difficult to quantify these effects of menu costs. The direct resource costs of changing prices are probably not very significant when x is in the single digits, but the effects on the dispersion and predictability of relative prices could be. As for asymmetries, there is not even clear evidence that they exist.[27]

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[27] One has to be careful to distinguish between two types of asymmetry. Type A, the kind described in the text, would make a given relative price or wage adjustment, in response to a given state of excess demand or supply, more likely to occur if it can be accomplished without reducing the nominal wage or price in question. Type B is the kind that makes wage- and price-setters more responsive to excess demand than to excess supply. There is plenty of evidence for type B asymmetry, in the form of (expectations-augmented) Phillips curves that are convex to the origin — that is, the lower the rate of unemployment the steeper the curve). But type B asymmetry is not relevant for the long-term choice of inflation. That choice depends on the marginal cost of reducing inflation when unemployment is at its natural rate, which in turn depends on the slope of the Phillips curve at the natural rate. If all asymmetry is type B, then that slope is independent of the expected rate of inflation, in which case it costs no more to reduce inflation by one point from an established rate of zero than from an established rate of 10 percent.

The extent of indexation in the Canadian economy is mixed.[28] As for the indexation of private contracts, the most evident lack is in financial markets, where indexed debt simply does not exist. This is also the market in which the lack of indexation matters the most in the present context — that of a steady, perfectly anticipated rate of inflation. In this context, nonindexed wage contracts can always build in wage increases to compensate for anticipated inflation. A Fisher effect can help compensate for anticipated inflation in debt contracts, but a special feature of nominal debt contracts prevents the Fisher effect from undoing all of the effects of inflation even when it is fully foreseen and the Fisher effect is one for one.

Specifically, most nominal debt contracts require level, nominal payment streams. Mortgage contracts, instalment loans, and standard personal loan contracts usually require a constant nominal amount to be repaid monthly. Bonds typically carry a constant nominal coupon until maturity. In all these cases, the real value of the payment stream, therefore, declines over time, to a degree that depends positively on the value of x. This "tilt" in real payments in effect shortens the real term to maturity of the debt contract, requiring the borrower to pay off a larger portion of the debt before any given date. Thus, it can also create liquidity problems for the borrower. A larger value of x will result, for example, in a larger initial real payment on a given mortgage contract, which will absorb a larger proportion of the household's disposable income.[29]

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[28] For a survey, see Peter Howitt, "Indexation and the Adjustment to Inflation in Canada," in John Sargent, research coordinator, *Postwar Macroeconomic Developments*, Royal Commission on the Economic Union and Development Prospects for Canada Research Studies 20 (Toronto: University of Toronto Press, 1986).

[29] Of course, this poses no problem for someone who wants a tilt, including many homeowners who would receive the greatest after-tax return on saving by putting that saving into paying down the mortgage. However, not everyone is in that position. The higher the rate of inflation the more people will find themselves constrained by inability to meet the initial payments of a conventional mortgage.

If financial markets operated as in a frictionless economy, the tilt would not create a problem of liquidity (nor would anything else!). The household whose mortgage payment required an increased initial real payment would just borrow even more on another contract, using the proceeds of this loan to maintain an accustomed standard of living, and repaying it when the real payments on the conventional mortgage contract had been eroded by inflation. But in fact even a household that was able to overcome the natural reluctance to solving a debt problem by going even further into debt would have trouble doing so in existing loan markets, where the second loan would typically have to be a second or third mortgage, at a higher interest rate than the first mortgage.

The tilt problem can be seen as part of a more general phenomenon, whereby a larger x raises the cost of liquidity.[30] Some of these effects arise from the chain of substitution described in the previous section, which lowers the real interest rate on all liquid assets. Some arise from the fact that the financial system is not set up to deal with a unit of value that is shrinking in real terms over time. This is manifested not only in the convention of level nominal debt payments but also in such practices as the conventional debt-service ratios used by banks and other financial intermediaries to determine whether a customer qualifies for a further loan of a given class.

The numerator of this ratio is the total monthly interest payment required of the borrower under existing debt contracts. In an inflation-neutral financial system, only the real interest payment would matter. The remainder of the payment constitutes an inflation compensation; it represents repayment of the real principal rather than interest. Yet, although it is illusory to treat this inflation compensation as a true cost of borrowing, that is what conventional debt-service ratios do. As a result, the larger x is the more a potential borrower will tend to be rationed, not because he is more indebted but because he is repaying his existing debt more rapidly.

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[30] Liquidity is a general term referring to the ease with which people can draw on their wealth by borrowing or selling an asset.

The nonindexation of laws, government programs, and taxes also gives rise to real effects of perfectly anticipated inflation. The indexation of family allowances and of brackets and exemptions in the personal income tax is now restricted to increases in the price level in excess of 3 percent each year. Thus, up to 3 percent, more inflation will mean a larger real revenue yielded by the personal income tax, and a smaller real outlay for transfer payments. These effects supplement the fiscal relief provided by inflation through seigniorage.

More important than this for the resource allocation process is the nonindexation of the tax treatment of capital income and expenses, through both the personal and corporate income tax. In the present context, that of perfectly foreseen and anticipated inflation, the nonindexation of the corporate income tax system is particularly important. There are three aspects to this. First, there is the deductibility of all nominal interest payments, including both real interest and the inflation compensation, even though the latter is not a true cost of borrowing. Second, under the first-in-first-out system in effect in Canada, the cost of sales for tax purposes is measured by the nominal cost of inventories produced at some time in the past. The larger x is the greater the extent to which this historical cost underestimates the true economic cost — that is, the replacement cost — of selling goods. Third, the use of historical rather than replacement cost also results in understatement of real depreciation expenses, by an amount that rises with x.

These aspects of nonindexation of the corporate tax system are important, but not because of their impact on the overall effective rate of corporate income taxation. The effects tend to cancel each other; a higher value for x tends to lower the tax rate through the first effect, but to raise it through the other two. Also, even if the effects do not exactly cancel each other, various *ad hoc* adjustments can be made to the tax system in response to an increase in inflation so as to keep the overall rate unchanged.[31]

Instead, nonindexation of the corporate tax system matters because it allows inflation to distort the relative rates of taxation across different classes of investments and different industries.[32] In particular, inflation raises the relative cost of investing in inventories and lowers the relative cost of investing in nondepreciable capital. It also tends to favor investment in industries, such as utilities, that rely heavily on debt financing. Although one can make a case that *ad hoc* adjustments offset the overall impact of inflation on the effective rate of corporate income taxation, they do not eliminate these distortions.

The distortion of the structure of taxation in turn distorts the allocation of investment. Through this effect, a larger x reduces the efficiency of the economy and the overall productivity of capital. Also, the deductibility of all nominal interest, including the inflation compensation that does not represent a real cost, encourages firms to engage in debt financing, which, in turn, tends to make the degree of leverage of the corporate sector an increasing function of x. Some believe that high debt-equity ratios in Canada were a major reason why the 1981–82 recession was more severe in this country than in any other member of the Organisation for Economic Co-operation and Development.[33] Leverage also contributes to the overall shortage of liquidity.

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[31] Examples include the accelerated depreciation introduced in 1972 on machinery and equipment in manufacturing and processing firms (Class 29 assets), the 3 percent inventory allowance introduced in 1977 but since phased out, the manufacturing and processing deduction introduced in 1973, and the investment tax credit.

[32] See Robin Boadway, Neil Bruce, and Jack Mintz, "Taxation, Inflation, and the Effective Marginal Tax Rate in Canada," *Canadian Journal of Economics* 17 (February 1984): 62–79; and John Bossons, "The Effect of Inflation on Effective Corporate-Level Tax Rates on New Investment: Inter-Industry and Inter-Firm Variability" (University of Toronto, Department of Economics, unpublished, 1983).

This tax distortion is not the only effect of inflation on the productivity of capital. There is also the effect, mentioned above, that works through increased transaction costs faced by firms, the effects of distortions attributable to menu costs and imperfect indexation of private contracts, and the effects, to be analyzed below, that work through the uncertainty of inflation. It is possible to estimate the sum of these effects by examining the effect of inflation on the real after-tax rate of interest, which should (approximately) equal the marginal product of capital.

In Canada's nonindexed tax system, the real after-tax rate of interest is given by the formula:

$$r = R(1 - t) - x$$

where R is the nominal rate of interest and t is the marginal tax rate. A commonly used number for t is 0.3. Most available evidence suggests that the long-term effect of x on R is less than one for one.[34] Even if there were a one-for-one Fisher effect, the effect of inflation on r would be $(1 - t) - 1 = -0.3$. Thus, the evidence suggests that a one-point increase in inflation reduces the after-tax marginal product of capital by at least three-tenths of a percentage point. Furthermore, almost all of this reduction must have come from a fall in the before-tax marginal product, because studies have found no strong effect of inflation on the effective tax rate on capital.[35]

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[33] See, for example, Henri-Paul Rousseau, "The Dome Syndrome: The Debt Overhanging Canadian Government and Business," *Canadian Public Policy* 9 (March 1983): 37–52.

[34] For a brief survey of the evidence, see Fried and Howitt, "The Effects of Inflation."

[35] See Boadway, Bruce, and Mintz, "Taxation, Inflation, and the Effective Marginal Tax Rate in Canada," for a Canadian study. There is another possible interpretation of the above facts — namely, that inflation...

Less-than-Perfect Adjustment to Inflation

This section adds one more real-world complication — namely, the fact that even if the rate of inflation is steady and is perfectly foreseen, it may take many years, even generations, before society has fully adjusted to it. In a way, lack of full indexation may be an example. Perhaps after several generations of 5 percent inflation or more, almost everything will have been indexed. This section looks at real effects of inflation that arise because of other forms of less-than-perfect adjustment. Again, a hypothetical economy is studied with a constant rate of inflation equal to x, which has been in place for long enough that people have come to expect it, but not long enough to have been anticipated in every sense. Again, the question of interest is the effect of x on real magnitudes.

The most notable effect will be redistributions of wealth between debtors and creditors, old and young, homeowners and renters. The size of the redistributions will depend not so much on x as on the difference between x and the expected rate of inflation underlying transactions that may have taken place many years in the past. Thus, if there is a lot of long-term debt, a larger-than-expected x will devalue it, thus transferring net wealth from creditor to debtor. In the reverse case, where x is less than expected, the increase in real indebtedness not only transfers real wealth but can have long-lasting effects on the

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35 - cont'd.

...increases premiums for risk and liquidity, with no effect on the marginal product of capital. To the extent that the risk premium is increased, it must be because the riskiness of capital has gone up, which has the same adverse effects as a fall in capital's marginal product. The interpretation that inflation affects just the liquidity premium might be valid if the rate of interest in question was the rate on a very liquid short-term asset. But, in fact, the less than one-for-one Fisher effect on which the above analysis is based is also found in long-term bonds, whose liquidity premium is probably too small to matter.

financial structure of the economy, as it may take many years for borrowers to reduce the burden of their debt.

The size of this transfer is reduced considerably by the fact that long-term debt is now much less common than it was a generation ago. The experience of unexpected inflation in the 1970s and 1980s is no doubt largely responsible for this development. For example, there are now almost no household mortgages with terms fixed for more than five years. This shortening of the nominal term-to-maturity of debt is magnified by the real shortening brought about by the tilt problem analyzed in the previous section. Thus, it now takes much less time than before for expectations of higher or lower inflation to be incorporated into debt contracts through a Fisher effect. In addition, much bank lending is done on a floating-rate basis, which means that the adjustment of the debt contract takes place as soon as expectations have been incorporated into short-term market interest rates.

One very important debtor affected by these considerations is the federal government. At one time, a rate of inflation greater than had been expected for several years would yield a windfall to the government by reducing the real value of the federal debt. In effect, the government earned seignorage on all the debt, not just on the monetary liabilities of the Bank of Canada. However, the average term-to-maturity of the federal debt has now fallen drastically. Much of it is in the form of Treasury bills with a term of 90 days, or Canada Savings Bonds that can be and often are presented for immediate redemption as soon as the expectation of increased inflation drives up interest rates on competing private securities. The shortening of debt severely limits the government's ability to raise revenue by means of surprise inflation.

Thus, despite the evidence of a less-than-full Fisher effect, it would be unwise for the government to count on inflation to reduce the real burden of its debt. This conclusion is buttressed by two additional considerations.

First, inflation follows monetary policy with a long lag. Combined with the large degree of international mobility of capital in the modern world, this makes it quite possible that unexpectedly inflationary monetary policies would increase the real burden of the federal debt rather than reduce it; the flight of capital engendered by the perception of these policies could force Canadian interest rates up many quarters before the appearance of the actual inflation, thus increasing the real rate of interest in the meantime.

Second, as argued in the previous section, the negative effect of inflation on interest rates probably also represents its negative effect on the productivity of capital. Thus, the reduced real interest rates that appear to the federal government as an escape from its fiscal problems really reflect an overall burden on the economy, and appear to the typical Canadian as a diminished real return to saving.[36]

Unanticipated inflation also tends to redistribute wealth from renters to homeowners. A larger x tends to increase the relative price of housing by stimulating the demand for housing as a hedge against inflation.[37] Thus, unanticipated inflation confers capital gains on homeowners in addition to reducing the real value of their mortgages. By raising the cost of housing, it also results in higher rents.

Because pensions are less-than-fully indexed, unanticipated inflation also redistributes real wealth from old to young. It reduces the real savings of people still working but on money-purchase plans. It also reduces the real pension benefit that will be received by people on defined-benefit plans in which the benefit depends on some moving average of wages. Finally, it reduces the value of the annuities and benefits of those who have already retired. The other side of this loss by the old is a gain to the young, who find their real debts reduced and who own equity in corporations faced with a reduced real pension liability. The redistribution is modified to some extent by *ex post* payments that firms often make to retired former employees to compensate for unexpected inflation, but this practice is far from universal, and the compensation tends to be less than complete.[38]

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[36] This can be viewed as another manifestation of the inefficiency of inflation as a form of taxation.

[37] This effect is strengthened by the nontaxation of the imputed rental income accruing to owner-occupied houses, but diminished by the liquidity problems faced by mortgagees as a result of the tilt.

Another example of less-than-full adjustment to inflation is the continued inability to adjust conventional accounting practices for inflation. This is to a large extent at the root of the failure to index capital income taxation. There are enormous practical difficulties in the way of appropriately evaluating the replacement cost of capital assets, difficulties that are magnified by inflation. These same difficulties also make it very difficult for people to read through conventional accounts of both private businesses and governments.

For example, the conventional practice of treating all nominal interest costs as a true cost of borrowing — thus failing to recognize that part is merely an inflation compensation — results in a gross overstatement of the losses of an indebted business enterprise, and in the deficit of an indebted government. Thus, the current nominal federal deficit of approximately $30 billion is really only $15 billion if account is taken of the effect of 5 percent inflation on the $300 billion federal debt. Yet this simple adjustment is almost never made in the public debate over debt and deficits in Canada.[39] It is hard to quantify the effects of such misperceptions on real magnitudes, but there can be no doubt that they seriously impede rational decisionmaking and the efficient allocation of resources in the economy.

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[38] See Howitt, "Indexation and the Adjustment to Inflation in Canada."

[39] The same is true of the adjustment that should be made for the growth in the real size of the economy, which, like inflation, has the effect of reducing the debt as a ratio to GNP.

Uncertain Inflation

Although the main object of this essay is to examine the effects of the average rate of inflation, not its variability, nevertheless the effects of inflation uncertainty are relevant if they are systematically related to the expected rate of inflation. Direct evidence of this relationship is hard to construct, since both expected inflation and its predictability are inherently subjective phenomena. Empirical investigations have tended to find that, over very long periods of time, there is a positive relationship between average inflation and its predictability, but that the relationship is an inverse one over the relatively short postwar period.[40]

There is, however, good reason for believing that inflation is most predictable when there is a public commitment to price stability. In a fiat money system such as Canada's,[41] it is doubtful that the conditions exist for people to calculate the probable rate of inflation on the basis of past observations, unless there is such a commitment. There is just no reason for believing that the process delivering inflation is stationary, and hence capable of being estimated consistently using standard statistical procedures. (If it is, there certainly are not yet enough data for the process to have revealed itself to economists.)

In the absence of any rational basis for calculating probabilities, people fall back on convention and simple rules of thumb. One such rule is to treat money as if it had a constant value. As we have seen, that rule is implicit in many accounting and financial conventions, even in this sophisticated age. Of course, that is not the only conceivable rule of thumb. One might imagine people eventually coming to regard, say, 4 percent as the "natural" rate of inflation. But that seems less likely; a convention of expecting zero inflation is the only one that would be constantly reinforced by people's daily experience of calculating values in units of money, and by the many other conventions in the economic and financial system.

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[40] See, for example, Howitt, "Indexation and the Adjustment to Inflation in Canada."

[41] Fiat money is money with no intrinsic value, whose availability is limited only by governmental decisions. The alternative is commodity money, such as existed under the gold standard.

Thus, even if inflation were held steady in the neighborhood of 4 percent, it is hard to imagine that the price level could ever become as predictable as if it were held steady in the neighborhood of zero. If, say, another oil price shock were to raise the rate of inflation by several points for a few years, a commitment by the Bank of Canada to return the rate eventually to zero would carry more conviction than a commitment to return it to 4 percent. After all, if 4, why not 4½, or 5?

Of course, this analysis is necessarily tentative, and will be contested by economists with greater faith in the rationality of expectations. But if it is right, then inflation uncertainty is systematically related to x.

The most obvious real consequence of inflation uncertainty is to put individuals at greater risk of real capital gains or losses through imperfectly indexed contracts, especially debt contracts and pensions. This effect is mitigated to some extent by the shortening of debt and the move to variable-rate debt contracts. But these adjustments are, at best, imperfect substitutes for indexation. By the same token, the uncertainty of real capital gains and losses faced by homeowners and pensioners is increased by inflation uncertainty. Also, the shortening of debt contracts has the effect of reducing liquidity in the economy by making it more difficult to finance long-term investment projects.

Inflation uncertainty also tends to reduce the level of investment and to distort its structure. It increases the risk attached to any real investment financed by debt, because of the uncertainty concerning the real interest costs of the debt. Also, the induced drying up of long-term credit markets makes it difficult to finance long-term investment. Both of these effects discourage the overall level of investment.[42] Furthermore, because households look to investment in housing as a hedge against inflation uncertainty, the structure of investment tends to be diverted from fixed business investment toward housing capital. All of these effects can be seen as another way in which inflation reduces the productivity of the economy in general, and that of capital in particular.

Inflation uncertainty also has a deleterious effect on the social fabric by increasing the frequency with which some people gain at the expense of others, for no reason other than the fortunes of inflation working through an imperfectly indexed financial system. This effect is magnified by the shortening of labor contracts that it induces, because more frequent labor negotiations imply a greater incidence of open conflict between labor and management.[43]

Finally, one of the serious inefficiencies generated by the uncertainty of inflation is the diversion of talent from the production of goods and services into finance. It is no accident that finance was among the sectors with the most noticeable innovations during the 1970s and 1980s. The need to protect against inflation uncertainty, and the opportunity to take advantage of others' inability to do so, diverted a lot of innovative thinking away from creating new goods and processes and into the invention of new financial contracts, new banking techniques, and new corporate financial strategies. Young people on Wall Street were paid huge salaries, but the cost of those salaries was paid by the rest of us, who were deprived of the medical services, scientific research, and so on that the financial whiz kids could have been producing.

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[42] The alternative of equity financing of real investment is discouraged by the relatively favorable tax treatment of debt induced by the tax deductibility of even the inflation-compensation part of interest cost. In any event, new issues of equity are not a very common source of finance for investment.

[43] See Louis N. Christophides and David A. Wilton, "The Determinants of Contract Length," *Journal of Monetary Economics* 13 (August 1983): 309–319.

This last aspect of the cost of inflation may indeed be the most important of all. All of the other adverse effects of inflation affect the level of productivity in the economy — the level of output attainable with the use of a given stock of factors of production. But if inflation diverts entrepreneurial talent and inventiveness away from productive applications, then it impairs not just the level but also the rate of growth of productivity, the ultimate source of which is the growth of useful knowledge brought about by investment in human capital, on-the-job experience, fundamental research, and industrial innovations. Reducing the level of productivity creates an output loss that grows as the economy grows. But reducing the rate of growth of productivity creates losses that grow much faster, because they alter the economy's growth rate itself. That is why it is potentially so important.

One study that attempts to measure the effect of inflation on the growth of labor productivity in Canada concludes that the effect of having the rate of inflation permanently higher by one percentage point is to reduce productivity growth by more than three-tenths of a percentage point.[44] If this estimate is correct, then the present discounted value of the gain to reducing inflation by one point is enormous. Suppose, for example, that future returns are discounted at a 4 percent real rate of interest and that real GNP is growing at a rate of 2½ percent per annum. Then, according to this estimate, the present value of the gain from reducing inflation permanently by one point equals more than 16 times current GNP.[45]

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[44] See Peter Jarrett and Jack Selody, "The Productivity-Inflation Nexus in Canada, 1963–79," *Review of Economics and Statistics* 64 (August 1982): 361–367.

[45] The present value of future GNP in Canada is equal to current GNP divided by a net discount factor, $d = r - g$, where r is the real interest rate and g is the rate of growth of real GNP. Initially, with $d = 0.04 - 0.025 = 0.015$, ...

Of course, there is no assurance that this estimate is correct; accordingly this conclusion must be treated tentatively. Nevertheless, in the absence of any other empirical estimates, one must take seriously the possibility that this is the order of magnitude of the long-term gain to society from having a lower rate of inflation.

The Effects of Reducing Inflation

The analysis up to this point has focused on the static question of what it is like to have an ongoing inflation at the rate x, or a given degree of uncertainty about the rate of inflation. But in order to achieve any long-term target other than the current rate of inflation, one must go through a transition in which inflation is changed from where it starts to the ultimate target. The costs of making the transition play a role in judging whether it is worth going to the new target. This section examines the real effects of reducing the rate of inflation.

The most obvious effect is that there will be substantial redistributions. Debtors will be hurt at the expense of creditors by the unexpected increase in the real rate of return on debt, and homeowners will suffer at the expense of renters, as the transition will result in a lower relative price of housing and a lower relative cost of renting. The young will generally lose at the expense of the old because of the increased real value of unindexed pension benefits. And, if the transition is achieved very rapidly, the increased real debt may cause serious problems of bankruptcy, or even a financial collapse. Among the debtors whose financial situation would be worsened by the transition, the federal government is perhaps the largest.

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45 - *cont'd.*

...that present value is 66⅔ times current GNP. According to Selody and Jarrett, reducing inflation by one point would make $g = 0.028$, and $d = 0.04 - 0.028 = 0.012$; thus, the present value would rise to 83⅓ times current GNP, with a gain equal to 16⅔ times current GNP.

The regional impact is also an important distributive aspect of the transition. Unfortunately, this is an empirical question on which there has been little useful research. If the transition is accomplished mainly through the use of monetary policy, one can make an educated guess about the qualitative aspect of this impact. The short-term effects of tighter money work through higher interest rates and a higher exchange rate. How the effects are distributed between these two variables depends on expectational considerations that are impossible to predict in advance. Higher exchange rates hurt all regions, since all are dependent on foreign markets for selling their output. But higher interest rates have their greatest contractionary impact on durable goods industries and on residential construction, which are heavily concentrated in Central Canada. These considerations indicate that Central Canada bears a disproportionately high cost of reducing inflation. However, even this very tentative conclusion must be modified to account for the likelihood that higher interest rates associated with disinflation will exacerbate the debt problems of prairie farmers, thus shifting the burden away from Central Canada.

One of the most significant transitional costs is the likelihood that a reduction in inflation will bring about slower growth or even a recession. Although there is no compelling reason for believing that lower inflation will be associated with a permanently higher rate of unemployment, it is almost inevitable that the economy will have to go through a period of higher unemployment as a consequence of the temporarily high interest and exchange rates.

According to one point of view, the unemployment cost of reducing inflation can be eliminated if the reduction is accomplished by means of a fully announced, fully believed policy. This theory asserts that deviations of unemployment from its natural rate exist only because actual inflation differs from expected inflation, and that such a policy would bring actual and expected inflation down at the same time. U.S. economist

Thomas Sargent, for example, argues that the costs of eliminating hyperinflations by means of fiscal reforms were relatively small in various countries during the interwar period.[46] Others point to the experience of Japan, which brought its very high rates of inflation under control in 1975 with little increase in unemployment.

This view, however, is not accepted by all economists. Many believe instead that the primary obstacle to reducing inflation without causing a recession is not that people will not expect the disinflation but the fact that inflation, and especially wage inflation, has a lot of inertia. Once there have been several years of 5 percent wage increases in the economy, workers tend to aim for 5 percent in their negotiations unless their demands are tempered by unusually high unemployment and excess capacity in the economy. Unemployment, by this view, is a necessary evil if inflation is to be reduced.

This view is supported by a great deal of evidence suggesting that wage inflation depends more on past inflation than on expectations of future inflation.[47] By this view, the experience of the hyperinflations that Sargent studied cannot be translated to the Canadian context because two important features of hyperinflation are not present in this country (at least not yet). Specifically, government deficits have not reached the point in Canada where they will lead inexorably to inflation unless drastic fiscal reforms are implemented, and inflation has not been driven so high that any change would likely be for the better. Likewise, the Japanese experience can be explained as a case where inflation had not been established for long enough to generate much momentum, and where uniquely Japanese labor-market institutions resulted in the cost of disinflation coming out more in the form of reduced output growth than in the form of unemployment.[48]

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[46] Thomas J. Sargent, "The Ends of Four Big Inflations," in Robert E. Hall, ed., *Inflation: Causes and Effects* (Chicago: University of Chicago Press, 1982).

[47] See, for example, Craig Riddell and Philip Smith, "Expected Inflation and Wage Changes in Canada," *Canadian Journal of Economics* 15 (August 1982): 377–394.

Whichever of these views is correct, it seems likely that reducing inflation will cause at least a temporary increase in unemployment. By the second view, the increase is inevitable. By the first view, policy must be helped by credible reforms of fiscal policy, or even more drastic legal or constitutional restraints on the Bank of Canada that make it clear to everyone that the Bank has neither the incentive nor the means to continue with the current rate of inflation. But the theory gives no unambiguous prescription for how to achieve credibility with politically feasible changes. Given the enormous difficulty of achieving even small deficit reductions, it seems that the only practical way of establishing credibility is to go ahead with the disinflation and induce people to revise their expectations by generating less inflation than they were expecting. During this period of expectation revision, there will be excessive unemployment according to either theory.

Both of these views accept that if there is an unemployment cost to disinflation, it will be just a temporary one, because in the long term unemployment will revert to its natural rate, which is independent of the rate of inflation. However, the multiple-equilibria theory of Diamond and others warns that the natural rate of unemployment may not be unique and that, accordingly, a severely restrictive monetary policy might shock the economy into a low-level equilibrium with permanently higher unemployment. Although this theory is still speculative, and economists lack a detailed understanding of how the economy would choose between equilibria, nevertheless this danger does constitute a possible cost of reducing inflation.

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[48] For this interpretation of the Japanese experience, see Stanley Fischer, "Monetary Policy and Performance in the U.S., Japan and Europe, 1973–86," in Yoshio Suzuki and M. Okabe, eds., *Toward a World of Economic Stability: Optimal Monetary Framework and Policy* (Tokyo: University of Tokyo Press, 1988); and Helmut Wagner, "Alternatives of Disinflation and Stability Policy — Costs, Efficiency and Implementability: A Comparison between Japan and West Germany," *Bank of Japan Monetary and Economic Studies* 7 (April 1989): 41–97.

The same applies for the possibility that there is "hysteresis" in the level of unemployment — that is, that the economy's natural rate of unemployment may increase permanently whenever the actual rate of unemployment increases, so that even after the initial shock that caused the rise in unemployment has disappeared, the rate of unemployment tends to remain higher forever.[49]

Even if there is no hysteresis in unemployment, there may well be hysteresis in output. That is, the lost investment in human capital and the growth of knowledge in general — because of reduced on-the-job training and reduced capacity utilization — may well cause a permanent lowering of productivity in the economy.[50]

Furthermore, even if there is no hysteresis in unemployment, experience in Canada since the 1981–82 recession makes it clear that the experience of a high actual rate of unemployment tends to raise the economy's natural rate of unemployment for a long time. The rate of unemployment has been very high by historical standards, yet there has been no tendency since 1983 for the rate of inflation to come down. If the actual rate had been above the natural rate of unemployment, inflation would have come down by now. So the natural rate must have risen. The usual list of structural, geographic, demographic, or policy variables accounting for changes in the natural rate cannot account for this rise, which one can therefore reasonably attribute to the mere fact that the actual rate of unemployment was shocked upward in the 1981–82 recession. Hysteresis is just an extreme, limiting case of a dependency of the natural rate on past actual rates of unemployment; the case in which the natural rate exhibits no tendency ever to return to its former level following a shock to the actual rate. But as long as the return is very slow, then the effect is almost the same. The kind of persistence that has been observed in recent years in Canadian unemployment adds greatly to the cost of disinflation, and must be taken into account in judging the appropriateness of a long-term inflation target.

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[49] For evidence of hysteresis in European unemployment in the 1970s and 1980s, see Blanchard and Summers, "Hysteresis and the European Unemployment Problem." More recent investigations have also produced evidence of hysteresis in Canada's unemployment rate (see Pierre Fortin, "Credit Crunches and Wage Dynamics: Revision of the Canadian Phillips Curve, 1957–1987" (paper presented to the Third Annual Conference of the Canadian Macro Study Group, Queen's University, Kingston, Ont., November 1989).

[50] This result follows as a straightforward conclusion from the modern theory of economic growth, which emphasizes that the growth of an economy's productivity is largely a function of the level at which the economy is operating, and that once an economy suffers a downward shock, the effect tends to be permanent (see Paul Romer, "Increasing Returns and Long Run Growth," *Journal of Political Economy* 94 [1986]: 1002–1037; and Robert E. Lucas, "On the Mechanics of Economic Development," *Journal of Monetary Economics* 22 [January 1988]: 3–42). The latter conclusion is also corroborated by recent findings of unit roots in aggregate time series (see, for example, John Campbell and Gregory Mankiw, "Are Output Fluctuations Transitory?" *Quarterly Journal of Economics* 102 [November 1987]: 857–880).

The Appropriate Target

Perhaps the first thing that should be noted about the appropriate inflation target is that it is not possible to arrive at a number for the target that would be optimal from the point of view of every Canadian. The choice of target implies huge distributional effects. Given any initial situation, the lower the target rate of inflation the greater the redistribution from young to old, from those at great risk of unemployment to those at less risk, from homeowners to renters, from debtors to creditors. These redistributional consequences may be as important as overall efficiency considerations.

The argument in this section focuses nevertheless on overall efficiency considerations, for several reasons. Redistributions are temporary, while the efficiency gains from moving to an optimal rate of inflation can be permanent. Also, even though the costs of reducing inflation may be unevenly distributed across the population, the gains will be shared by almost all Canadians. Finally, to the extent that those who bear a disproportionate burden of the cost of disinflation can be identified, they can also be compensated.

In attempting to identify the appropriate target rate of inflation, it is useful to ask first what average rate of inflation would be best if there were no cost of changing from the current rate, and then to ask how the answer would have to be modified when costs of adjusting to a lower rate are taken into account.

On the first question, the bulk of the preceding analysis suggests that the best rate of inflation is zero. That is the rate that would minimize the costs of nonindexation and imperfect price adjustment. As we have seen, these costs go far beyond the direct resource costs of changing prices and indexing contracts, in the following ways:

- they introduce distortions into conventional accounting procedures that impede efficient decisionmaking;
- they increase the dispersion of relative prices above that which is determined by underlying considerations of tastes and technology;
- they reduce the informational efficiency of the price system;
- they create liquidity problems of the sort characterized by the "tilt";
- they impede the efficient allocation of credit through conventional financial practices that are based implicitly on zero inflation; and
- they distort the allocation of investment across different classes of investment and different industries.

In addition, zero is the target rate at which the uncertainty of inflation would be minimized. The costs of inflation uncertainty are pervasive. They include the distortion of investment decisions, the reduction of the overall level of investment, the thinning out of long-term credit markets, the diversion of talent into finance from more socially useful activities, the reduction of the price system's informational efficiency, and the disruption of social peace through arbitrary redistributions of real wealth and more frequent labor-management conflicts.

If this were all there were to it, the choice of target would be simple. But there are also considerations that argue in favor of more or less than zero, and these considerations must be dealt with. On the one hand, there is the "optimum-quantity-of-money" argument, to the effect that shoe-leather costs would be minimized by a negative rate of inflation, equal in absolute value to the real rate of interest. On the other hand, a positive rate would provide additional revenues for a fiscally troubled federal government.

On balance, the shoe-leather argument for negative inflation is more compelling than the fiscal argument for positive inflation. While it may be true that the conventional measure of this cost makes it appear small, and while it is also true that the gain from reducing inflation from 1 percent to zero would be even smaller than from 5 percent to 4 percent, nevertheless there are good reasons for believing that the cost is underestimated by the conventional measure.

The fiscal argument is that positive inflation would provide fiscal relief through seigniorage, through the potential reduction in the real costs of the government debt, and perhaps through the lack of complete indexation of the taxation system. There are, however, strong reasons for dismissing this argument. Seigniorage is an inefficient form of taxation, and inflationary policies are likely to cause more fiscal problems than they solve. More generally, the worst evils of a fiat money system arise from the difficulty of forecasting the price level when there is no anchor to the value of money. The only workable defense against such evils in the Canadian system as presently constituted is the assurance by the Bank of Canada that monetary policy will not submit to the political forces driving the federal government's fiscal problems. Finally, relying on inflation to raise tax revenues subverts Canada's system of parliamentary democracy, one of whose first principles is that all tax measures are to be proposed in and passed by the House of Commons, not undertaken unilaterally by the unelected officials of the central bank.

To summarize the argument to this point, there are a host of reasons why the best average rate of inflation, ignoring costs of getting there, is zero, together with a possibly important but as yet empirically unsubstantiated shoe-leather argument for slightly less than zero. Until firm evidence is provided for taking the shoe-leather argument more seriously, one may conclude that the best average rate of inflation to inherit is either zero or very close to zero.

What about the costs of reducing inflation? These are mainly incurred in the form of unemployment and lost output, and they are potentially very large, especially given the evidence of hysteresis, or at least near-hysteresis, in Canadian unemployment. What difference should this consideration make?

According to one point of view, the unemployment costs of reducing inflation should not affect the ultimate target rate of inflation, but should just affect how fast the target is approached. This conclusion would require that the economy's natural rate of unemployment also be an optimal rate, in that further unemployment reductions would result in workers' taking too little leisure, and job searchers' leaving unemployment before finding the job that optimally matched their skills.[51] Then rapid disinflation that involved a substantial rise of unemployment above the natural rate might not be desirable. But a disinflation so gradual that unemployment never rose much above the natural and, by assumption, optimal rate would be worthwhile as long as inflation was positive.

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[51] See, for example, E. Prescott, "Efficiency of the Natural Rate," *Journal of Political Economy* 83 (December 1975): 1229-1236.

Unfortunately for this argument, there is no good reason to think that the natural rate of unemployment is optimal. Indeed, there are good reasons to think the natural rate exceeds the optimal rate. To the extent that the natural rate arises from job rejection induced by unemployment insurance, or lack of hiring attributable to minimum wage laws, it represents an overall loss the economy. To the extent that it arises from imperfections in the economic system, it is also higher than optimal.[52] Furthermore, even if the natural rate were optimal from the point of view of overall efficiency, it would not be optimal from the point of view of those with a high risk of unemployment.

Thus, in order to estimate the optimal target rate of inflation, one must somehow balance the gains from reducing inflation against the costs of doing so. The reduction in inflation should continue as long as the present discounted value of the benefits to society from a further small reduction exceeds the present discounted value of the cost. The optimal target rate is the rate at which the benefit of further reduction just equals the cost of raising unemployment by the required amount above the natural rate. Since the natural rate is already higher than optimal, the cost will not be negligible. Thus, it will be optimal to stop disinflation even when the gain from further reduction is still positive; the optimal target is probably somewhere above zero.

An exact numerical value for the optimal target rate is too much to hope for, given the present state of economic knowledge. However, one can draw on evidence to argue that the optimal target is less than the current 5 percent rate; that the cost of reducing inflation from 5 percent to 4 percent would be less than the benefit. The following estimates are based on the assumption that the real rate of interest at which future benefits should be discounted is 4 percent, and that real GNP will grow at the rate of 2½ percent per year.

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[52] Such imperfection might include the power of insiders to keep wages high at the expense of the unemployed (see Assar Lindbeck and Dennis Snower, *The Insider-Outsider Theory of Employment and Unemployment* [Cambridge, Mass.: MIT Press, 1988]), or frictions in the matching process (see Dale Mortenson, "Job Search and Labor Market Analysis," in O.C. Ashenfelter and R. Layard, eds., *Handbook of Labor Economics*, vol. 2 [Amsterdam: North-Holland, 1986]).

Evidence on the cost of reducing inflation can be drawn from the experience of the inflation reduction brought about by the 1981–82 recession. By 1988, inflation had come down by about 7.7 percentage points.[53] Most of the reduction had been accomplished by 1984. In 1980 and 1981, the rate of unemployment was 7.5 percent. After rising sharply in 1982 and 1983, the unemployment rate fell gradually until again reaching about 7.5 percent in 1989. From the perspective of 1982, the present value of this seven-year rise of unemployment above 7.5 percent can be calculated, assuming that each percentage point rise in the unemployment rate for a year costs society the equivalent of 2 percent of GNP.[54] The result is a cost equal to 36 percent of 1982 GNP.[55] If all of that cost is attributed to the disinflation, then the cost of reducing inflation worked out to (36 / 7.7 =) 4.7 percent of current GNP for each percentage point of inflation reduction.

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[53] This is the average of the fall in Consumer Price Index inflation and the fall in the rate of increase in the GDP deflator from 1981 to 1988.

[54] Most estimates of that percentage equivalent (Okun's coefficient) would put it at about 2.5. One study, however, points out that, for making welfare calculations, the coefficient should be reduced from 2.5 to about 2 to take into account the increased leisure and household production made possible by reduced employment (see Bernard Fortin and André Bernier, "The Welfare Cost of Unemployment in Quebec: Harberger's Triangle Meets Okun's Gap," *Canadian Journal of Economics* 21 [February 1988]: 161–181).

[55] The formula for this calculation of the cost of reducing inflation is:

$$C_t/GNP_t = 2\sum_{i=0}^{6}(1.025/1.04)^i\,(u_{t+i} - 0.075),$$

where C is the cost, $t = 1982$, and u is the rate of unemployment.

Now consider the gains. At one extreme, if one takes seriously the empirical estimate by Jarrett and Selody that a one percentage point reduction of inflation would raise productivity growth by three-tenths of a percentage point, the gain from reducing inflation by one point works out to be 16⅔ times current GNP. This gain vastly exceeds any reasonable measure of the cost. Indeed, it is so large that one hesitates to place too much weight on it in the absence of corroborating evidence. Accordingly, a more conservative estimate is in order.

Suppose the only aspect to the cost of inflation was the reduction of the productivity of capital, arising through a combination of the various adverse effects of inflation identified above. To keep the estimate conservative, assume that inflation does not affect the rate of growth of productivity, just its level; that the impairment of productivity affects just the productivity of capital, not the productivity of labor.

Recall that a one point reduction in inflation increases the marginal product of capital by at least three-tenths of a percentage point. Since there is no plausible mechanism through which a fall in inflation can lead to a reduction in the capital stock, one can presume that the rise in the marginal product represents an increase in the productivity of a given stock of capital. Since the return to capital represents about one-quarter of GNP, the effect of this enhanced productivity would be to increase GNP by about 1.875 percent.[56] Since the effect is permanent, the present discounted value of the gain would be 125 percent of GNP.

Thus, even under these conservative assumptions, the current discounted value of the gain to society from reducing inflation further below the current 5 percent level is far greater than the estimate of the cost presented here. This does not lead to a numerical estimate of the optimal target rate of inflation. But it does imply that the optimal target is much less than the current 5 percent level, even under conservative assumptions regarding the benefits to society from reducing inflation.

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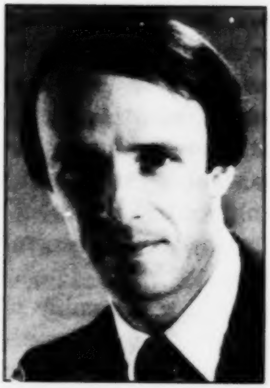
[56] The proportional increase in GNP equals $(1 / 4) \times (.003) / (.04) = .01875$.

This conclusion would be reinforced if one considered that the costs of reducing inflation could be mitigated by the use of fiscal, regional, manpower, and other policies. An efficient assignment of instruments to targets would give monetary policy the task of controlling inflation, and these instruments, which ultimately have no influence on inflation, the task of dealing with transitional unemployment. Whether or not the political process will employ these other instruments efficiently to mitigate unemployment is questionable. But to the extent that something along these lines is forthcoming, the above calculations will exaggerate the cost of reducing inflation.

Finally, account should be taken of the fact that the Bank of Canada cannot control precisely the tradeoff between inflation and unemployment. The best it can do is to resist inflation during the expansionary phase of the business cycle. Recessions are inevitable, and when they come they reduce inflation. Thus, by exercising restraint during the expansion, the Bank can ensure that the average rate of inflation over one business cycle is less than over the previous one. The preceding analysis leads to the conclusion that the Bank is justified in doing this for at least as long as inflation remains near its current rate.

In summary, zero is probably the best rate of inflation if it can be accomplished at no unemployment cost. This conclusion follows from the many adverse consequences of inflation that have been identified, all of which impair the efficiency and productivity of the Canadian economy. Unfortunately, there are also substantial costs to reducing inflation. Because of these costs, it would probably be optimal to stop before reaching zero inflation. Nevertheless, the optimal target is certainly less than the current 5 percent rate. The Bank of Canada should continue with its efforts to restrain the rise of inflation during the expansionary phase of the business cycle, so that the average rate of inflation will gradually come down from one cycle to the next. Exactly at what point these efforts should cease is not clear. Nor does the Bank have sufficiently precise control over the rate of inflation to be able to choose between, say, a target of zero and a target of 1 percent. Thus, for all practical purposes, a target of zero inflation may be the right one. In any event, a sensibly gradual policy would allow it plenty of time before it had to choose between zero and some other small number. In the meantime, the Bank should continue aiming in the direction of zero.



Do We Measure Inflation Correctly?*

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Consumer- *versus* Producer-Price Indexes: Which Is Best?

The phenomenon of inflation is a state of ongoing increase in the average price level of all goods and services flowing through the economy.

But what is the best measure of the general price level? The great American economist Irving Fisher long ago gave us the logical answer to this question: it is the average price of *all* transactions carried out in the economy in a given period, whether they involve consumption goods or capital goods, inputs or outputs, intermediate or final goods, real or financial exchanges, domestic or foreign purchases. In this ideal price measure, each transaction would receive a weight equal to its particular monetary requirement.[1] However, the Fisher transactions price index is so broad and would be so costly to construct that it does not currently exist in any country. Our choice of broad price index is limited by what is available. In practice, this means the much narrower price indexes calculated for final consumption or final production by central statistical agencies such as Statistics Canada.

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There are indeed two ways to measure the flow-value of goods and services: through consumption and through production. They are not the same, for two reasons. First, we do not consume all our production — in addition to consumer goods, we make investment goods, and goods for exports to foreign countries. Second, we do not produce everything we consume — we also import part from abroad. In other words,

Consumption + Investment + Exports = Production + Imports.[2]

Correspondingly, the two broad price measures that are most in use are the average price of consumption, called the Consumer Price Index (CPI),[3] and the average price of production, called the Gross Domestic Product Implicit Price Index (or GDP deflator, for short).

The trends in the CPI and the GDP deflator have been quite similar over long periods. During the 1962–88 period, the excess of CPI inflation over GDP-deflator inflation was a mere 0.1 of a percentage point per year on average. During the 1972–88 period, the average annual excess was a bit higher — 0.4 of a percentage point. But, of course, over short periods the two inflation measures can sometimes diverge more substantially. Figure 1 depicts the year-to-year swings in the ratio of consumption to production prices since 1972.[4] In particular, note its pronounced decline from 1971 to 1976 and very sharp increase from 1980 to 1986.

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[1] Irving Fisher, *The Purchasing Power of Money* (New York: Macmillan, 1913). I am reminded of Fisher's view by a recent unpublished Bank of Canada memorandum by Robert Ford, "Measuring Inflation" (Ottawa, September 1988).

[2] Here, consumption, investment, exports, and imports all include public as well as private goods and services; exports and imports encompass both consumption and investment goods.

[3] Since governments offer most of the goods and services they produce free of charge, there are very few observable prices for public goods and services. Consequently, only the prices of private goods and services bought and sold in the marketplace are included in the CPI.

Such divergent trends can occur under two types of circumstances: when the prices of investment goods increase much faster or much more slowly than those for consumer goods, and/or when the ratio of export to import prices (commonly called the "terms of trade") increases or decreases sharply. For example, the 1971–76 period was marked by a substantial increase in Canada's terms of trade arising from very firm world prices for natural resource exports such as cereals, oil and gas, and metals and minerals. As a result, the consumer-producer price ratio plummeted. Conversely, the 1980–86 period witnessed very soft world markets for Canada's commodity exports, as well as sharply declining computer prices that held back the rise in investment goods.[5] As a result, the consumer-producer price ratio shot up.

The choice of price measure is not a mere theoretical concern. It can sometimes be critical to assessing correctly how strong inflation pressure is and will be, and thereby can make a big difference for decisions on monetary, fiscal, and even

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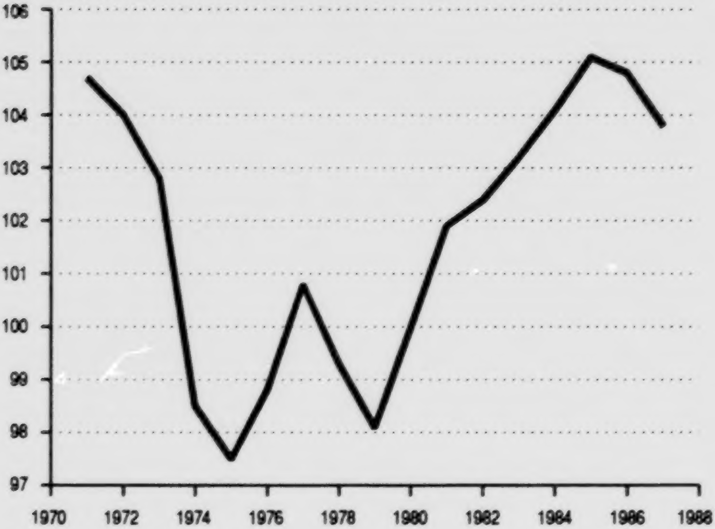
[4] The GDP deflator is Statistics Canada's fixed-weight index, which purges the traditional index from compositional changes that often severely distort inflation signals. Further clarifications about the GDP deflator can be found in Statistics Canada, *National Income and Expenditure Accounts, the Annual Estimates*, Cat. no. 13-201. The CPI is explained below.

[5] A more detailed analysis of these trends can be found in Barry Cozier, "Real Wages in Canada: An Analysis of Recent Trends", *Bank of Canada Review*, November 1989, pp. 3–17. Cozier goes one step further to define the useful notion of GDP deflator net of indirect taxes.

Figure 1

Ratio between the Consumer Price Index and the Fixed-Weight GDP Deflator, Canada, 1971–88
(1981 = 100)



Sources: Statistics Canada, *National Income and Expenditure Accounts*, Cat. no. 13-001, various issues; and idem, *The Consumer Price Index*, Cat. no. 62-001, various issues.

incomes policy. For instance, in 1974 the CPI rose 10.9 percent over its 1973 level, while the fixed-weight GDP deflator increased by as much as 15.8 percent — a difference of nearly 5 percentage points. Apparently, the authorities paid a lot of attention to the GDP inflation figure, because they feared that it was giving an early signal of the further acceleration of consumer prices. They believed that the greatly enhanced ability of producers to pay higher wages would start a wage explosion, which would then feed back onto consumer prices. In fact, wage settlements in excess of 15 percent in 1975 confirmed their worst fears and led to the imposition of wage and price controls under the Anti-Inflation Program.

A more recent example occurred during the 1986–88 period, when CPI inflation remained relatively stable at about 4.1 percent while GDP inflation increased from 3.1 percent in 1986 to 5.1 percent in 1988. Which message was the right one: the CPI indication that inflation was stable, or the GDP signal that it was accelerating? Obviously, the Bank of Canada's repeated warnings during the 1987–89 period that inflation was rising and had to be contained through strict monetary discipline indicated that the authorities were again very concerned by the upward trend in GDP inflation and were determined to keep it under control. Short-term interest rates and the value of the Canadian dollar rose sharply. Again, the perceived danger was that the increased ability of firms to pay higher wages might feed back onto the acceleration of wages, and then consumer prices. Actually, both average wage growth and CPI inflation did rise somewhat, up to about 5 percent in 1989.

So, which index of average prices and inflation is better: the consumer-price measure or the producer-price measure? The straight answer is that our ultimate concern over a number of years should be with consumer-price inflation. This is because the cardinal economic objective of society is to improve the standard of living of its members, which, in turn, comes from the activity of real consumption, whose average price the CPI attempts to measure.

However, measures such as producer prices or wage inflation remain useful to the extent that they can be used as timely indicators of future developments on the consumer-price front. The historical examples described above make clear that they are indeed forward-looking indicators.[6] This is not accidental. Because firms generally attempt to cover their costs of production, and because wages are usually the most important cost item, any change in the current trend of wage inflation is bound to be reflected in sales-price inflation later on. Similarly, current producer-price inflation reflects changes in firms' ability to pay higher incomes (including wages) and therefore also contains useful information concerning future sales prices.

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[6] The GDP deflator for a given quarter is published two months after the end of the quarter. This information lag reduces its usefulness somewhat, but...

Both in theory and in practice, the CPI is the most important measure of the average price level in the economy. It is given prominence by the media, and it is widely used as an instrument for indexing social transfers, setting all sorts of nominal targets, and indexing labor and other contracts. The next section explains how the "ideal" measure of the average price of consumption (or "true" cost-of-living index) is defined and how the CPI actually goes about measuring it.

How Do We Measure the Average Price of Consumption?

The first thing to note is that, to be useful, the notion of "average price of consumption," or "cost of living," must be a relative, not an absolute, concept. It is not meaningful to speak of a high or low average price or cost of living without comparing two situations. Since we are interested in inflation, we want to know whether consumer prices are on average higher in the current period than in some earlier period — usually called the "base period." Consequently, the average price we want to obtain must be based on the ratios of current- to base-period prices

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6 - cont'd.

...the delay is partially made up by the more timely publication of component indices such as the CPI, housing prices, construction prices, and import and export prices. Wage data are also available only with a two-month delay. Nevertheless, data on union wage settlements remain useful indicators of future inflation because labor contracts are typically signed for two to three years, and current contracts influence future contracts in both the union and nonunion sectors. Unfortunately, coverage is very incomplete.

for the individual goods and services considered. Each individual price ratio is greater than, equal to, or smaller than 1, according to whether the corresponding absolute price has increased, remained unchanged, or decreased. It is then said that there has been overall inflation, price stability, or deflation if the average of the price ratios — the overall price index — is itself greater than, equal to, or smaller than 1.[7]

Second, one has to face the problem that there is an infinity of ways of computing an average. A basis must be found for preferring and selecting one particular method over any other. Here, the economic theory of consumption suggests, quite naturally, that the average price of consumer goods and services should be thought to increase if the (minimum) cost to the consumer of achieving a given constant satisfaction (or "utility") level rises when the set of prices changes from the base period to the present. The cost of living is then said to increase. This view is now universally accepted, and provides the logical basis for calculation of the Cost-of-Living or Consumer Price Index.

The CPI, which is produced by Statistics Canada, measures the cost of purchasing a constant basket of consumption goods and services at current prices in any given month, compared with a base period in which the average cost of the basket is arbitrarily set at $100. In Canada, the custom is to take as the base period the most recent decennial census year (currently 1981), and therefore to change it every ten years. In the United States, the current base period is the three-year period 1982–84. The choice of base period is a simple matter of convenience; it does not affect the measurement of the percentage change in the CPI between periods, which is the concept we really want to get at.

However, the choice of the constant basket of items that serves as the basis of cost-of-living calculations *is* consequential. The basket is made up of the average quantities of all goods and services actually consumed by a "reference group" of consumers in some "reference year." The group currently includes all private households (families and individuals) living in Canadian urban centers with a population of 30,000 or more (plus Whitehorse and Yellowknife). The expenditure data for the reference year is collected from the nation-wide Family Expenditure Survey, which Statistics Canada conducts every four years.[8] The last survey took place in 1986, and the next one is scheduled for 1990. The basket is then adjusted to the findings of the survey within about two years. The most recent adjustment was introduced in January 1989 on the basis of the 1986 survey. Note, therefore, that the reference (or survey) year is not the same as the base year, and that even if the basket of consumption goods and services is constant from month to month, it nevertheless is updated every four years.

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[7] It is customary to multiply the average by 100 and to make comparisons on that basis instead.

It follows that the CPI can be defined in two perfectly equivalent ways. First, it is the ratio of the cost of purchasing the constant basket at current-period prices to the cost of purchasing it at base-period prices. In other words, it is an index of the cost of living off a constant basket of goods and services. Second, in the terms used above, it is a weighted average of the ratios of current- to base-period prices for individual goods and services, with each weight being set at a level that equals the fraction of the total consumption expenditure (at base-period prices) that the reference group spent on the particular item in the reference year. In other words, the CPI is also an index of the average price of privately consumed goods and services.

The year-to-year percentage change in the CPI — that is, the CPI inflation rate — is shown in Figure 2 for the 1960–89 period. Two features stand out. First, the cost of living has never stopped increasing, so that the CPI annual inflation rate

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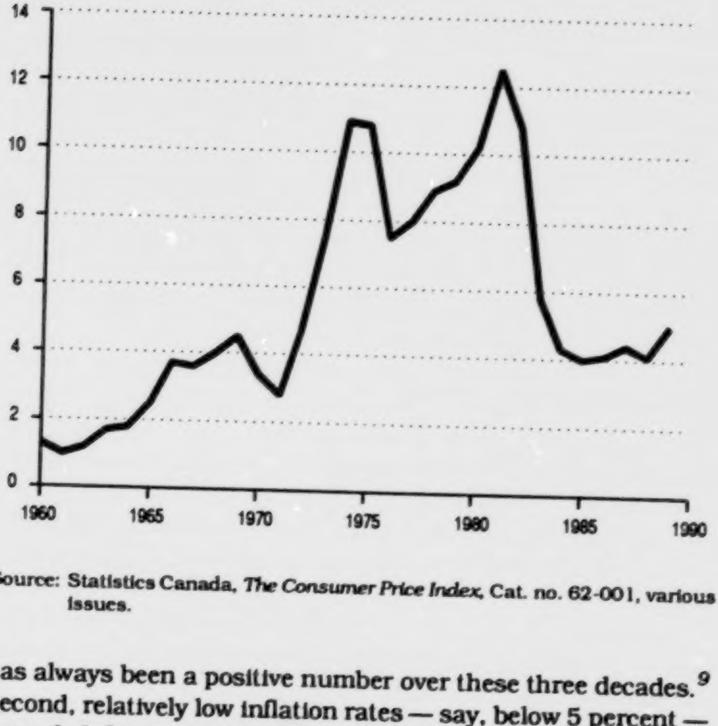
[8] Statistics Canada, *Family Expenditure in Canada*, Cat. no. 62-555, Occasional.

Figure 2

The Consumer Price Index, Canada, 1960–89

(annual percentage change)



Source: Statistics Canada, *The Consumer Price Index*, Cat. no. 62-001, various issues.

has always been a positive number over these three decades.[9] Second, relatively low inflation rates — say, below 5 percent — prevailed from 1959 to 1972 and from 1983 to 1989, but relatively high inflation rates marked the 1972–83 period. The conspicuous peaks of 1974–75 and 1980–82 exceeded 10 percent and it is the experiences of these years that have made us sensitive to inflation and its economic costs.

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[9] The CPI decreased sharply — that is, there was deflation — over a few years in the 1930s. Slightly negative inflation rates have also been observed in Japan and West Germany in recent years.

How Good a Measure of "True" Inflation Is the CPI Inflation Rate?

There is some distance between the theoretical, welfare-based concept of the CPI, or "true" cost-of-living index, defined earlier and its practical monthly implementation by Statistics Canada. In general, the literature on price measurement recognizes the possibility that the actual CPI can be subject to a number of biases as a measure of the theoretical notion of "true" consumer-price inflation. The three major candidates are the substitution bias, the new-goods bias, and the quality bias. In addition, there is concern with the volatility of one major component of the CPI — the owned-accommodation index.

The Substitution Bias

First, as noted earlier, the theoretical notion of the cost of living refers to the (minimum) cost to the consumer of buying a constant satisfaction (or "utility") level. Instead, however, the calculated CPI measures the cost of purchasing a constant basket of goods and services. While the constant basket selected arguably holds the satisfaction level constant by maintaining quantities consumed unchanged over time, there is in principle an infinity of other baskets, each with a different set of quantities, that can procure the same "utility" level to the consumer. Some will have more food, but fewer housing services; more clothing, but less beer; more books, but a smaller car or no car at all, and so on.

The crucial point is that relative price patterns do not stay constant, but change all the time as the prices of some items increase faster (sometimes much faster) than others. It is therefore likely that, even with unchanged purchasing power, the consumer will buy fewer of the goods and services whose prices increase faster (such as heating oil in the 1970s), and more of those whose prices increase more slowly or decrease (such as home computers in the 1980s).

This is just one way of stating the fundamental Law of Demand in economics. However, by assuming away all substitution possibilities, the constant basket retained for the calculation of the CPI squarely contradicts this law. It overestimates quantities consumed for items with fast-rising prices, and underestimates quantities consumed for items with slow-rising or falling prices. As a result, changes in the overall CPI tend to overestimate the true rate of consumer-price inflation (or the true increase in the cost of living), a well-understood phenomenon known as the "substitution bias." Moreover, if relative price trends are persistent, the extent of the bias increases as one draws further away from the reference year.

The substitution bias would be prohibitively costly to correct entirely. That would require updating the consumption basket by undertaking the Family Expenditure Survey on something like a monthly basis. Since the survey is conducted only once every four years, we have to live with the bias between successive updates of the basket, which are introduced two years after the Survey itself. For example, the basket from the 1986 Family Expenditure Survey will be kept from January 1989 to December 1992, and will be replaced by the 1990 basket in January 1993.

Fortunately, the substitution bias is not too bad, since consumers adjust their behavior only very slowly in the face of relative price changes. That is, there is intrinsic persistence in consumption habits. The relevant empirical evidence on the magnitude of the problem can be found in studies by Généreux and by Manser and McDonald,[10] who provided very detailed investigations of the extent of substitution bias for Canada

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[10] Pierre A. Généreux, "Impact of the Choice of Formulae on the Canadian Consumer Price Index," in Diewert and Montmarquette, eds., *Price Level Measurement*, pp. 489–511; and Marilyn E. Manser and Richard J. McDonald, "An Analysis of Substitution Bias in Measuring Inflation, 1959–85," *Econometrica* 56 (July 1988): 909–930.

(1957–78) and the United States (1959–85), respectively. The results of the two studies are quite similar: the CPI inflation rate would overestimate the true annual inflation rate by an average of 0.15 to 0.20 of a percentage point. This is a small order of magnitude, given in particular that both samples include years (1972–83) of very sharp changes in relative price patterns.[11]

The New-Goods Bias

The second type of bias that slips into the calculation of the CPI is the "new-goods bias." While the substitution bias arises from maintaining constant for four years the quantities of goods and services that existed at the time of the last Family Expenditure Survey, the new-goods bias results from new consumer goods that are first introduced to the consumer between the last survey and the next one. The lag in incorporation of a new good into CPI calculations, if it is not missed by the survey, ranges from two to six years depending on the timing of appearance between two successive surveys. For example, suppose that compact disc players first came onto the market in 1983. They would not have been included in the 1982 Family Expenditure Survey, but they would have been picked up by the 1986 Survey and become part of the CPI only in 1989, six years after their first appearance.

The key observation here is that most new goods begin their careers with a relatively high price and a low volume of sales. Over time, the price goes down and the volume goes up, a familiar trend known to market experts as the "product cycle." Since the new goods are introduced into CPI calculations (if at all) with an average lag of four years, the CPI often entirely misses the period of falling price and rising volumes. Consequently, true CPI inflation is overestimated.

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[11] See Alan S. Blinder, "The Consumer Price Index and the Measurement of Recent Inflation," *Brookings Papers on Economic Activity* (2:1980): 544–547, for evidence that the substitution bias was substantial for food in 1978 and gasoline in 1979 in the United States.

How bad is the new-goods bias? Economists are not sure yet, but it could be far from negligible in periods when many new consumer durables are introduced. Microwave ovens, video cassette recorders, "Walkmans," home computers, compact disc players, and backyard earth satellite dishes are conspicuous recent examples. To illustrate the problem, assume that between two successive updates of the CPI basket, expenditure on new goods actually increases to 3 percent of total consumer expenditure while the average relative price of new goods falls by 50 percent (or about 15 percent per year). Then, changes in the CPI would overestimate the average inflation rate by about 0.4 of a percentage point per year.[12]

In this illustration, the new-goods bias would be twice as large as the substitution bias estimated in the Généreux and Manser-McDonald studies. The combined impact of the two types of bias would add up to an average upward bias of 0.6 of a percentage point for measured annual CPI inflation. I am not exactly sure how realistic the illustration for the new-goods bias is, but it would not seem *a priori* to exaggerate recent experience. Professor Erwin Diewert, of the University of British Columbia, thinks that the new-goods bias could well be larger and could lead the official CPI to overestimate the annual inflation rate by 0.5 to 1 percentage point.[13]

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[12] Assume, for simplicity, that the official CPI (omitting new goods) is 100 in the last year (year 4) of the constant basket. Then, instead, the "true" CPI (including new goods) would be (0.97) x (100) + (0.03) x (50) = 98.5. The upward bias for the annual inflation rate over the four years would be about (100 − 98.5) / 4, or 0.4 of a percentage point.

[13] W. Erwin Diewert, "A Note on the Neglect of New Goods Bias" (University of British Columbia, Vancouver, September 1985, unpublished). See also his "Index Numbers," in J. Eatwell, M. Milgate, and P. Newman, eds., *The New Palgrave: A Dictionary of Economics*, vol. 2 (London: Macmillan, 1987), pp. 767–780.

The Quality Bias

The CPI may be affected by still a third type of measurement error, known as the "quality bias." The theoretical concepts of average price of consumption or cost of living are based on goods and services of unchanging quality. If a good simultaneously becomes of better quality and sells at a higher price, then the true (or "pure") price increase consists only of the fraction of the total price adjustment that is not associated with the quality change. If the quality improvement is not taken into account, the rate of inflation will be overestimated.

It is still widely assumed that the quality of goods and services improves over time and that a central statistical agency such as Statistics Canada does not adjust the CPI for quality change, which would impart a serious upward bias in measured CPI inflation. This popular view can be questioned on two grounds.

First, even if price-measurement experts do not quarrel with the presumption that, on balance, innovations and technical change bring us better products, they nevertheless recognize that there are many exceptions to that generalization. Second, Statistics Canada does, in fact, make corrections to the CPI for quality changes. So, the real question is whether these corrections overstate or understate the true magnitude of such changes.[14]

Statistics Canada adjusts CPI calculations for quality changes in five different commodity groups: motor vehicles; clothing, furniture, household textiles, and floor coverings; appliances, kitchen equipment, tableware, and other household equipment; shelter; and other goods and services.[15] The procedures are based on analytical principles as well as on "good judgment." Much effort goes to costing the quality changes and to distinguishing between cosmetic and genuine changes. Depending on the importance of the quality change, store personnel, retail-outlet management, distributors, or manufacturers are consulted. Coverage is obviously incomplete, but it is broad and impressive.[16]

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[14] This view was forcefully argued by Jack E. Triplett, "Quality Bias in Price Indexes and New Methods of Quality Measurement," in Z. Griliches, ed., *Price Indexes and Quality Change: Studies in New Methods of Measurement* (Cambridge, Mass.: Harvard University Press, 1971), Chapter 6.

[15] See Andrew Baldwin, "Quality Adjustment in the Consumer Price Index" (Statistics Canada, Ottawa, October 1984, unpublished).

Statistics Canada apparently is reasonably confident about its procedures. Its official CPI publications state clearly that the constant basket of goods and services is of an unchanging quality, and that changes in the costs of this basket are due only to price movements that are "pure" and not associated with changes in quality.[17] Over the years, researchers have attempted to second-guess the statistical agencies on the issue of quality adjustment. Sophisticated techniques such as "hedonic" or "vintage-price" methods have been applied, mostly to consumer durables (motor vehicles, major household appliances) and some services (hospital care, housing).[18] These techniques are also subject to measurement errors, but it is interesting to note that there has been no general recognition of overall bias of any important magnitude. Both the estimated sign and the magnitude of the quality bias vary widely across studies.[19] The fact that very few new studies have appeared since the mid-1970s could be interpreted as implicit admission by academic researchers that the official procedures are hard to improve on after all.

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[16] Tongue in cheek, Baldwin (ibid. p. 6) admits that "measurement of quality changes for such service items as admission to entertainment and post-secondary tuition fees raises philosophical questions best left to those who understand them"!

[17] See Statistics Canada, *The Consumer Price Index Reference Paper*, Cat. no. 62-553, Occasional; idem, *Consumer Prices and Price Indexes*, Cat. no. 62-010, Quarterly; and idem, *The Consumer Price Index*, Cat. no. 62-001, Monthly.

[18] Griliches, ed., *Price Indexes and Quality Change*, contains a useful exposition of these techniques as well as several applications.

[19] See Jack E. Triplett, "The Measurement of Inflation: A Survey of Research on the Accuracy of Price Indexes," in P.H. Earl, ed., *Analysis of Inflation* (Lexington, Mass.: Lexington Books, 1975), Chapter 2, for a comprehensive survey of studies up to the mid-1970s.

The one notable exception is the so-called "aging bias" of the rented-accommodation component of the CPI. Statistics Canada assumes that observed movements in rents apply to a stock of rented units or houses of unchanging quality. Hence, all rent increases are taken as reflecting pure price movements. This imparts a downward bias in the rent index, since normal depreciation actually reduces the quality of the rented stock over time. A recent study based on the hedonic method calculates that the aging bias in the United States, which applies there to both rented and owned accommodation, could lead to an underestimation of the rate of increase of the shelter-cost index of 0.3 to 0.4 of a percentage point annually.[20] In Canada, the bias applies only to the rented-accommodation component of the shelter index because, contrary to its U.S. counterpart, the Canadian owned-accommodation index does include an explicit replacement-cost component. The effect of a bias of this magnitude on the overall annual CPI inflation rate would be negligible, however, since the weight of the rented-accommodation component in the all-item CPI is only about 8 percent.[21]

Three conclusions stem from the literature on the quality bias. First, to extract pure price movements from observed price changes through adjustment for quality change is a difficult task, but one that is crucial for the proper measurement of consumer-price inflation. Second, quality adjustment receives much attention from Statistics Canada, and the organization seems broadly satisfied with its current procedures.

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[20] William C. Randolph, "Housing Depreciation and Aging Bias in the Consumer Price Index," *Journal of Economic and Business Statistics* 6 (July 1988): 359-371.

[21] Taking the upper limit of Randolph's estimate (0.4 of a percentage point) as the relevant magnitude of the bias leads to an underestimation of the true inflation rate of just about 0.03 of a percentage point (since 0.08 x 0.004 = 0.00032).

Third, in spite of the considerable effort researchers have devoted to double-checking the official procedures, there is no general recognition of serious upward or downward quality bias of any important magnitude for the calculated aggregate CPI inflation rate.

The Volatility of the Owned-Accommodation Index

The final problem concerns the volatility of the owned-accommodation component of the CPI, which accounts for about 15 percent of consumer expenditure. Owned accommodation presents special difficulties, because owner-occupied houses are durable goods. There are other durable goods in the CPI, of course, but owned homes are by far the most important. The perceived problem is not that the method Statistics Canada uses for calculating the owned-accommodation index is biased upward or downward on average, but that it fluctuates widely over short periods. However, price volatility in some components of the CPI — food and energy prices being notable examples — is not by itself a defect of the calculation procedures as long as they reflect the real world.

The Canadian owned-accommodation index is based on one variant of the "user-cost" approach to measuring the cost to homeowners of housing services they consume. It incorporates five components: maintenance and repairs; property taxes; insurance premiums; mortgage-interest costs; and replacement costs. Omitted from the standard list of user-cost items are foregone interest on invested capital and capital appreciation. However, these elements, while important, are arguably not as directly related to the consumer aspect of homeownership as the other five.

The Canadian definition differs from those employed in the United States both before and after the 1983 overhaul of that country's homeownership index. The pre-1983 U.S. index essentially measured the average purchase price of new dwellings. It priced the stock of new dwellings, not the cost to homeowners of consuming housing services from old and new dwellings. It was therefore fraught with a severe conceptual deficiency, in addition to being extremely volatile in the short term, as one can guess.[22] Since 1983, the United States has measured the cost of the dwelling services of owner-occupied homes by imputing the rents on tenant-occupied dwellings, thus effectively adopting a rental-equivalence concept. This is much more sensible than the new-purchases concept, and solves the problem of extreme short-term price volatility. However, it neglects any difference between the cost of being an owner and that of being a tenant, which is quite a strong assumption, especially in view of the all-important mortgage-interest deductibility from income taxes allowed in the United States. In addition, the owned-accommodation index based on rental equivalence naturally "imports" the aging bias of the rental-accommodation index.

All in all, the Canadian definition seems preferable. To be sure, there remains a problem with the short-term instability of the replacement-cost component of the index, which is set equal to 2 percent of a new-dwelling price index based on the official New Housing Price Indexes.[23] These are based on contractors' selling prices for new dwellings (exclusive of land), collected from large-scale builders in major urban centers. Hence, their volatility is entirely reflected in the replacement-cost index — in recent years, annual percentage changes in this index have varied from a low of -0.3 percent in 1983 to a high of 15.0 percent in 1986 and back to 8.0 percent in 1989.

Since the weight of the index in the total CPI is about 3 percent, relative price variations of 10 percent or more, such as were observed in 1982 or 1987, can raise or lower the total CPI inflation rate by 0.3 of a percentage point or more, which is proportionately not negligible when the inflation rate is below, say, 5 percent. By contrast, the mortgage-interest-cost component of the owned-accommodation index is much less sensitive to short-term changes in the prices of new dwellings and in mortgage-interest rates, because that component is a multiyear moving average of current and past dwelling prices and interest rates.[24]

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[22] See Blinder, "The Consumer Price Index and the Measurement of Recent Inflation," for a thorough examination of this issue.

[23] These can be found in Statistics Canada, *Construction Price Statistics*, Cat. no. 62-007, Monthly.

However, it is hard to see what could logically be done about the volatility of the replacement-cost index — except to lower the depreciation rate from the current 2 percent level to a perhaps more reasonable 1.5 percent. This cost is genuinely incurred by consumers who have to rebuild their houses or engage in major reparations to maintain market values. Changing the whole owned-accommodation index from the user-cost concept to the U.S. concept of rental equivalence (which is clearly less volatile) is not desirable either. It would entail losing useful, differentiated information about the owned-home market, as well as extending to that market the aging bias that induces underestimation of rental-accommodation price changes. So, the verdict is that the volatility of the owned-accommodation index reflects the true price situation faced by the consumer, just as in the cases of food and energy. We have to learn to live with it.

Conclusion

From the point of view of economic welfare over a medium- to long-term perspective, the measurement of inflation at the level of the entire economy should be related to aggregate consumption, not production, activity. Production-price indexes such as the GDP deflator, as well as wage-growth measures such as union-wage-settlement data, remain very useful for specific purposes and for the general purpose of anticipating future trends in consumer prices. But the central economic task of society is to improve standards of living, which is best approximated by real consumption, the average price of which the CPI attempts to measure.

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[24] The mortgage-interest-cost index is a pretty timely one. It closely reflects changes in average actual mortgage payment outlays of homeowners. See Statistics Canada, *The Consumer Price Index Reference Paper*, Cat. no. 62-553, for details.

Problems arise, however, when one contrasts the "true" theoretical notion of the average price of consumption, or cost of living — the cost to the consumer of buying a constant satisfaction level — with its practical implementation by the Consumer Price Index — the cost to the consumer of buying a constant basket of goods and services. This is because a constant basket arguably gives rise to constant satisfaction, but constant satisfaction can be obtained from a multitude of baskets.

This difference between the theoretical concept of the cost-of-living index and the calculated CPI can generate three types of biases: the substitution bias, the new-goods bias, and the quality bias.

The substitution bias arises from the consumer's natural tendency to shift purchases away from goods whose prices increase relatively faster and toward goods whose prices increase more slowly or fall. Maintaining the basket constant for a number of years under these conditions implicitly gives too much weight to the first type of goods and too little to the second type, and therefore imparts an upward bias in the CPI inflation rate. Empirical evidence for Canada and the United States indicates, however, that this bias would not exceed 0.2 of a percentage point for the CPI annual inflation rate.

The new-goods bias is due to the long delay — two to six years — in introducing new consumer goods into the CPI basket. The delay is inversely related to the frequency of revision of the basket, which in Canada occurs once every four years. The key point is that newly introduced goods usually undergo a cycle of falling prices and rising sales that likely occurs before they become part of the revised basket. Since the CPI misses the period of falling prices, it becomes *ipso facto* upward-biased. Hard empirical evidence on the magnitude of the new-goods bias for the annual CPI inflation rate is not yet available, but "realistic" estimates could put it between 0.3 and 0.8 of a percentage point. The combined substitution and new-goods biases would then add up to between 0.5 and 1 percentage point per year.

The quality bias would add to the other two if the average quality of consumer goods improved over time, and if nothing were done to adjust CPI calculations for this trend. While the first condition may be true, the second is not. Statistics Canada and other central statistical agencies make every effort to extract from registered price increases the "pure" price movements that are not associated with quality changes. They advertise the CPI basket as being one of unchanged quantity and quality. Whether the adjustment procedures leave important measurement errors that introduce a quality bias into the CPI inflation measure has been the subject of intense investigation by researchers in the past quarter-century, but no general recognition of serious upward or downward bias of any important magnitude has emerged from these efforts.

The use of the CPI to measure consumer-price inflation may be unsatisfactory not only because of the presence of systematic biases such as the three just mentioned, but also because the inappropriate measurement of some components of the index would lead to excessive volatility. The most frequently mentioned problem with the CPI in this respect is the high instability of its owned-accommodation subindex, which can be traced back mainly to the replacement-cost component of owned accommodation. However, no logical basis has been found to adjust the CPI for this perceived problem. The replacement cost measured by Statistics Canada is a true economic cost to homeowners of consuming housing services, and its omission would introduce into the owned-accommodation index the same "aging bias" as currently vitiates the measurement of the price of rental accommodation.

The implications of this review of price-measurement problems for zero-inflation targeting by the Bank of Canada are threefold. First, consumer-price inflation is the concept of inflation most directly related to economic welfare and most consistent with the medium- to long-term nature of the envisaged target. Second, producer-price indexes and wage-growth measures remain useful for anticipating future trends in consumer prices. Third, the most widely used measure of the consumer inflation rate, based on the Consumer Price Index, is subject to an upward bias of an estimated magnitude of perhaps 0.5 to 1 percentage point per year if the effects of the substitution and new-goods biases are added up. For practical purposes, therefore, one could consider aggregate price stability to be achieved if the CPI inflation rate were maintained in that range.

The Zero-Inflation Target: An Overview of the Economic Issues*

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Introduction

Zero inflation, price-level stability, constancy in the purchasing power of money: the phrases seem so simple and precise, but, as the contributors to this volume make clear, that simplicity and precision are quite spurious. Pierre Fortin shows that there is no such thing as the price level, and that the measurement of a useful representative price level, such as the Consumer Price Index (CPI), is subject to a good deal of ambiguity.

In a closely related way, Douglas Purvis shows that the degree of control that the policy authorities actually have over prices is insufficient to do more than keep price-level fluctuations within certain bounds. A major theme of Purvis's paper, and of Peter Howitt's commentary too, is that, if price level fluctuations are not already within those bounds, then getting them there is also likely to be an uncertain and perhaps costly business. But Howitt argues that there are also costs involved in staying where we are and that, on balance, with due acknowledgment to all the uncertainties and imprecisions involved, it is worthwhile to bring the Canadian inflation rate down, and then to keep it down. In this brief overview, I shall outline the economic arguments that underlie this conclusion.

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* I am grateful to Peter Howitt, Richard Lipsey, and Douglas Purvis for comments on an earlier draft.

Measuring Inflation

All of the above-mentioned uncertainties about measurement, and imprecisions in control mechanisms, have a single source — namely, that the price level is not a variable that anyone in the economy directly or consciously sets. The greengrocer sets the price of vegetables, the butcher the price of hamburger, the hotelier the price of vacation accommodation, the dealer the price of furniture, and so on down the list of all the goods and services that Canadians buy. The "general price level" attempts to summarize in a single number the overall impact of those specific decisions on the degree of material well-being that Canadians can obtain with a constant money expenditure. There is no single number that can measure precisely so complex a concept.

When the money prices of particular goods vary, the effect this has on the cost of living facing specific individuals depends on how important those particular goods are for them. A 10 percent increase in the price of children's clothing is quite irrelevant to the material well-being of a working couple without children, but can create a crisis for a single parent of two infants living on welfare. It would be possible to multiply such examples without limit, but all would point the same moral: the effect that a particular set of price changes has on the well-being of particular consumers depends on their tastes and needs, and those differ among consumers. There are, in principle, as many measures of the general price level as there are individuals buying goods and services.

If we want a single meaningful measure of the "cost of living," it has to be of the cost of living of some "representative"

Canadian household. That is what the CPI tries to be, but the representative household is itself a statistical artifact, and what happens to its cost of living over time cannot, by its very nature, give more than a rough and ready guide to what is happening to that of any actual household. And this is not to mention the fact, which Fortin stresses, that the consumption patterns of actual households — and hence of the "representative" household, too — vary over time as new goods come onto the market, the quality of existing ones changes, and the pattern of relative prices fluctuates, thus introducing additional biases into the CPI. The fact remains that if, given its tastes and needs, the specific cost of living of any actual Canadian household is rising, this matters to the household in question. The CPI does not measure precisely the cost of living of any actual household, but it is nevertheless fair to argue that if the index is rising, then the cost of living of any actual household is more likely to be rising than falling, and that the faster it is rising, then the faster is the cost of living of any actual household likely to be rising, too.

The upshot of Fortin's careful discussion of these issues is that the CPI is a crude summary indicator of the influence of price changes on the capacity of Canadians to satisfy their material wants with given money incomes, that it is imprecise, and that it is subject to bias into the bargain. But Fortin also implies that the CPI remains a useful rough and ready guide — indeed, the most useful one available — to the outcome of important economic processes. Fortin tells us that, if its rate of increase is held — on average, over time — to about 1 percent per annum (the upper bound to bias in the index according to Fortin), then most Canadians will experience something close to constancy in their own individual costs of living.

The phrase "on average, over time" here is important. It is inconceivable that any kind of economic policy compatible with the operation of a market economy can control what happens to the general price level on a month-by-month, quarter-by-quarter, or even year-by-year basis. Too many factors, specific to the markets for particular goods, can impinge on individual prices for that to be possible. We all know from experience that a bad winter in Florida can affect the price of fresh fruit — and hence the food component of the overall price index — and that the activities of the Organization of Petroleum Exporting Countries can influence its energy component for longer than that. About all we can say in general is that the effects of such specific shocks on the overall inflation rate tend to cancel one another out with the passage of time, so that over a two- or three-year period, say, what economists often call the "core inflation" rate — the long-term average pace at which prices rise — comes to dominate price-level behavior.[1]

Expectations, Money Growth, and Inflation

The core inflation rate, Purvis argues, can be controlled by policy and, more specifically, by monetary policy, even though the vast majority of the literally thousands of individual pricing decisions whose outcomes it summarizes are taken without conscious reference to the stance of policy. The individual producers or dealers in a specific class of goods take notice of the state of demand for those goods, and the costs of providing them, in setting their prices. If we set aside pathological environments such as those produced by hyperinflations of the type experienced in certain European countries after the two world wars, or more recently in Latin America, these forces are dominated by factors local to the market for the goods in question rather than general inflationary conditions.[2] Economy-wide forces are always at work, to be sure, but their effects are often minor enough to be unidentifiable as influences on the prices of particular items. Nevertheless, when one moves to the level of the economy as a whole and considers the behavior of prices in general, the local factors will tend to cancel out, and the economy-wide effects — which, as Purvis argues, are overwhelmingly monetary in origin — become predominant.

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[1] The late Otto Eckstein originated the phrase "core inflation." See his *Core Inflation* (Englewood Cliffs, N.J.: Prentice-Hall, 1981).

[2] In order to keep matters in perspective here, the reader should note that, following Philip Cagan, economists usually reserve the phrase "hyperinflation" for periods in which prices rise at a rate in excess of 50 percent a month. See Philip Cagan, "The Monetary Dynamics of Hyperinflation," in Milton Friedman, ed., *Studies in the Quantity Theory of Money* (Chicago: University of Chicago Press, 1956).

Every economic agent, be it a firm, household, or individual, carries out transactions using money — notes and coins for small ones such as paying cab fares or buying lunches, and bank deposits for larger ones such as paying credit-card bills — and hence finds it convenient to keep a certain inventory of money on hand to be used when needed. The inventory in question will fluctuate over time as payments are made and received. That is what inventories are supposed to do. But on average, there is a certain level of cash on hand and in the bank with which agents feel comfortable. If their holdings fall short of that amount for too long, they begin to feel squeezed for liquidity and take steps to remedy the situation, and if their holdings exceed it, they look for some better use for the excess than sitting idly in a wallet or chequing account.

An agent who is short of cash may cut back on expenditure to make good the deficiency, sell an income-earning asset, or extend some line of credit; and an agent with an excess will tend to increase expenditure, acquire some asset that earns a better rate of return than a bank account, or pay off some debt incurred in the past. If the majority of agents in an economy are short of liquidity, demand for goods in general will be depressed and pressure on credit markets will push interest rates up — an effect which will have its own further depressing influence on expenditure as its interest-sensitive components are curtailed. The process will operate in reverse if most agents experience an excess of liquidity. These simple mechanisms underlie what Purvis refers to as the "consensus model" of the interaction of money and the general price level.

The quantity of money available to be held in the Canadian economy is determined not by its holders, but by the behavior of the banking system, which, in turn, responds to the actions of the Bank of Canada. If that quantity grows more (less) rapidly than agents' willingness to hold it, then a widely diffused upward (downward) pressure will be exerted on the demand side of various markets; price-setters will be tempted to raise (cut) the money prices of individual goods, and hence the price level will tend to be bid up (down) relative to the value it might otherwise have taken. The Bank, therefore, working through the operations of the commercial banking system, has the power to control the behavior of the general price level. If it was able to predict with perfect accuracy the time path of the economy's overall demand for inventories of cash, and able to control with perfect accuracy the commercial banks' propensity to make that cash available, it would be able to control, if not the general price level, then at least the overall volume of money expenditures — with perfect accuracy, too. But even these conditions are far from being met in practice. And if the Bank was to be able infallibly to control the price level, it would in addition need extra tools to influence the quantities of goods to be traded; only in this way could it ensure that changes in expenditures would be translated immediately and completely into changes in prices.

Economics is well known — perhaps notorious would be a better word — for its use of the phrase "other things being equal," but it is much needed at this point in the argument. It is well established empirically that, in Canada as elsewhere, "other things being equal," the general public's holdings of cash inventories vary with real income — the volume of goods and services to be traded in the economy — and in proportion to the general price level. That is to say, at the same level of output, the sum of agents in the economy will require twice the amount of cash on hand if the price level is doubled. These relationships underlie the well-known proposition that if the rate of growth of money in the economy is held roughly equal to the rate of growth of real output, approximate price stability will be assured. If they were all that mattered, and if they were stable over time, any tendencies for what one might call "cost-push factors" operating on the economy's supply side would be largely irrelevant. Any attempt by, say, a powerful monopoly group to raise money wages and prices, to the extent that it was initially successful, would tend to create a liquidity shortage. This would produce offsetting downward pressures on the demand side of markets as buyers tried to maintain the purchasing power of their inventories of cash. But matters are complicated by the fact that other things seldom remain equal. Innovations in payments systems and in banking practices have, in recent years, kept these relationships shifting around.

The implication here, however, is not that the underlying forces on which Purvis's consensus model focuses have ceased to work in the Canadian economy. Rather, it is that one cannot expect them to operate to maintain price stability if the Bank of Canada simply sets a uniquely "appropriate" rate of money growth once and for all and then maintains it into the indefinite future. A more active policy stance than that is required, with constant monitoring and assessment of the significance of ongoing institutional developments. It is inconceivable that these activities can be carried out with sufficient speed and accuracy to enable monetary policy to be adjusted so as to remain always and precisely on track.[3] Nevertheless, other economies similarly subject to institutional change — West Germany, Switzerland, or Japan, say — have until recently experienced inflation rates that, though they have fluctuated, have nevertheless done so about average values verging on zero. This fact suggests that, as a practical matter, the trick can be managed in Canada, too. This conclusion, however, leads to the question of whether it is worth the effort to do so.

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[3] For a more detailed discussion of this matter, see "What Do We Really Know about Monetary Policy?" Ch. 9 of David Laidler, *Taking Money Seriously* (Oxford: Philip Allan; Cambridge, Mass.: MIT Press, 1990).

The Benefits of Zero Inflation

The factors that one must weigh in deciding on the desirability of zero inflation as a policy target fall into two categories: those that are relevant to the performance of the economy at zero inflation as opposed to an inflation rate in the 5 percent range, and those having to do with the consequences of making a move from 5 percent inflation to zero. It will be convenient to discuss these matters in turn, and both Howitt and Purvis have much to say that is relevant to the first of them.

To begin with, and crucially, it is an implication of Purvis's "consensus" model of the macroeconomic behavior of an idealized economy that its "real" performance — that is to say, the level of output and employment at which it operates — will not be worse at zero inflation. Indeed, Howitt's more detailed analysis suggests that it is likely to be better. Until the early 1970s, the majority of economists would probably have taken quite the contrary position here, so it is worthwhile to consider why the consensus view has changed.[4]

During the past two decades, in the light of both theoretical developments and experience, economists' understanding of what determines the core inflation rate has deepened. Until the early 1970s, many believed that modern mixed economies had built into their institutional framework a deep-seated tendency to generate cost-push inflation. Monopolies in goods markets, not to mention powerful trade unions, seemed to have an ability, and indeed a propensity, to push up money wages and prices in particular sectors of the economy independently of the state of demand for those sectors' products. This, it was believed, presented policymakers with something of a dilemma. They could either aim for zero inflation, in which case they would have to keep demand in the economy tight enough to be continuously forcing down wages and prices in more competitive sectors, or they could accommodate the monopolistic sectors, and settle for an overall core inflation rate determined by their activities, in which case it was not necessary to keep the rest of the economy continuously depressed.

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[4] For a survey of the literature on inflation during the period when economists' perceptions of the nature of the inflation-unemployment tradeoff were changing, see David Laidler and Michael Parkin, "Inflation — A Survey," *Economic Journal* 85 (September 1975).

Another line of argument leading to much the same conclusion has it that it is easier for firms to raise than to lower the money wages they pay and the money prices they put on their products. Because, in an economy undergoing structural changes, relative prices have to change, it follows that needed adjustments will go more smoothly if prices on average are allowed to rise gently. In this way, firms that must lower relative wages and prices are not also forced to cut their absolute money values, but can make the necessary changes simply by raising the latter either not at all or by less than the economy-wide average. That is to say, a little inflation is viewed as a lubricant for structural change. Applied to the current Canadian situation, either of the above lines of argument implies that zero inflation could only be bought at the price of permanently depressed output and employment, and there are still some reputable macroeconomists who defend this conclusion.[5]

In the absence of actual experience of zero inflation in the Canadian economy, it is hard definitively to settle disagreements about whether the economy would operate at lower levels of output and employment in such circumstances. Suffice it here to explain that the economists who no longer hold this position have abandoned it because of the importance they attach to the role played by expectations about the future course of inflation in price- and wage-setting behavior. Simply put, their argument is that, when seeking to exercise monopoly power, large corporations and unions are intent on making real gains. They are concerned not with the money value of their incomes, but with what those incomes will buy. Similarly, it is difficult for firms in declining industries to impose real wage cuts involving lower living standards on their employees and to accept lower real rewards for their owners.

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[5] See, for example, R.F. Lucas, "A Zero Inflation Target," *Canadian Public Policy* 15 (March 1989).

If the argument just presented is correct, then the rigidities to which the older consensus position points might still exist, but they operate relative to the rate of inflation that agents expect to prevail in the near future. A union wanting a 4 percent increase in its members' living standards will push for a 4 percent wage increase if it expects price-level stability, but it will push equally hard for 9 percent if it expects inflation to run at 5 percent over the period of the contract. A firm that is reluctant to cut the money price of its product in conditions of price stability will be equally reluctant to raise it by less than 5 percent when prices in general are expected to rise at that rate. The implication here is that the "little inflation" that might lubricate the economy has to be inflation a little above what agents expect. Given that agents are capable of learning, any constant inflation rate is likely to become expected, and once that has happened its beneficial effects will evaporate.

It would follow that, in the current Canadian context, an inflation rate in the 5 percent range, which agents have come to expect and make allowances for, albeit unconsciously, in their price- and wage-setting behavior will enable the economy to operate no more smoothly than a similarly widely anticipated inflation rate of zero. At one time, advocates of this line of argument would go on to claim that, regardless of the long-term inflation rate, the frictions associated with economic adjustment would always generate the same level of unemployment, which they referred to as the "natural" rate. It is important to point out, therefore, that neither Howitt nor Purvis makes any claim about the constancy or uniqueness of this unemployment rate. Neither of them claims that the degree of friction in the economy is likely to be constant over time, or impervious to the effects of a whole host of policy measures. Rather, it is claimed that the effects of the frictions in question cannot be systematically mitigated by operating the economy at a higher rather than a lower average rate of inflation; indeed, there are excellent reasons to believe that inflation itself generates frictions that become less important as its rate is reduced.

The frictions associated with positive inflation, to which I have just alluded, are the very essence of the case for zero inflation. If they were not present, then there would be no particular point in choosing zero rather than any other inflation rate as the long-term target for policy. Howitt discusses them in considerable detail, and so it will be enough to deal with them briefly here.

It is helpful to think of the costs of inflation as falling into two categories: those stemming directly from the behavior of the general price level and that would exist if that behavior was not the outcome of a myriad individual pricing decisions taken by different agents in different markets; and those that arise specifically from the latter source.

As Howitt explains, ongoing inflation erodes the purchasing power of wealth held in any type of asset denominated in terms of money. Thus, it penalizes anyone whose wealth is in this form. Pensioners, holders of government or, indeed, privately issued bonds, bank and trust company deposits, and so forth all — other things being equal — lose from inflation, and those to whom they have lent gain. Ongoing inflation, then, carries with it a considerable potential for redistributing wealth from such creditors to debtors, and prominent among the former are old people living on fixed-money incomes. Now, this proposition has to be qualified because one would not necessarily expect other things to remain equal in the face of an ongoing inflation that agents expect to continue. Interest rates do rise with such an inflation, and this effect does help to mitigate creditors' losses; pensions can be, and sometimes are, indexed; and so on. In principle, the inflation protection alluded to here could be complete, but in practice it seldom is. Taxes are levied in Canada on the whole of interest receipts, and not just their noninflationary component; most private pension plans are partially indexed, if at all. Economists do not pretend to understand why the private sector has not resorted to extensive indexation to cope with such problems or why voters have not forced the public sector to do likewise during an inflationary episode that has now endured for two decades, but they cannot ignore the fact that these things have not happened. Inflation does redistribute wealth; that is inequitable, and in this important sense inflation is costly.

Creditors are not passive in the face of inflation, of course. They do attempt to cut down on their holdings of nominal assets — not least, inventories of cash — but it is a mistake to think of such actions as mitigating the costs of inflation. They certainly reduce (but do not eliminate) its redistributive impact; but they also, so Howitt argues, make the operations of the financial system generally, and the monetary system in particular, less efficient in a well-defined sense. The resources devoted to second guessing inflation and to lessening its impact are privately productive to the individuals who deploy them in this way. In the absence of inflation, though, those resources would be available to be devoted to other, potentially more socially productive, uses. For example, accountants who are not needed to protect a company's net worth from the impact of inflation can be redeployed to planning for its future real expansion instead.

Quite apart from the distorting influence of inflation on financial markets, a whole array of other deleterious effects arise from the fact that the behavior of the general price level is the outcome of a host of individual pricing decisions implemented in specific markets.

To begin with, in an inflationary environment, such decisions have to be taken more frequently. Each individual agent has, at least, to keep up with the pack. Once again, though, it takes real resources to implement price changes and, to the extent that they are prompted solely by inflation, resources so used are, from a social standpoint, wasted. And this is to say nothing of the fact that money-wage and price changes are not synchronized across the economy, and take place for reasons other than inflation. Elementary economics textbooks and popular commentators alike sing the praises of the price mechanism as an efficient device for conveying information to economic agents and helping to coordinate their activities in a socially productive manner. By and large they are right to do so. But when price signals become contaminated by interference from inflation, the messages they convey become harder to read, and the efficiency with which the economy's activities are coordinated begins to suffer.

As the reader of Howitt's paper will know, to the extent that the resources wasted in coping with inflation might otherwise have been devoted to investment or research and development activities, its destructive effects do not just lower the level of the economy's efficiency at a particular moment, but also perhaps the rate at which it might be expected to improve over time. The fact that some of inflation's effects are easier to quantify than others does not, then, detract from his basic conclusion that it is socially costly and better avoided. But Howitt is careful not to overstate the policy implications that follow from this, and so should we. He does not suggest that zero inflation is in some economic sense necessarily a technical optimum value for the variable. His arguments, however, lead one to conclude that, given a choice between the Canadian economy as it is and an alternative version of that economy which was not experiencing — and had not in recent history experienced — any inflation, one should choose the latter. However, Howitt's analysis also warns that one may not, without further analysis, conclude that, given the current state of the Canadian economy, it is beneficial to move to achieve zero inflation. There are, beyond any reasonable doubt, costs, and significant costs at that, involved in making the adjustment. It is to a discussion of these costs that we now turn.

The Costs of Attaining Zero Inflation

It has been stressed repeatedly in this essay that no one sets the general price level, that its behavior is rather the outcome of a host of individual pricing decisions taken with respect to particular goods and services. In the previous section, following Howitt's analysis, it was also noted that to make and implement those individual pricing decisions uses up real resources. The costs of reducing inflation stem from the interaction of these two circumstances. To see why this is so, suppose for a moment that neither of them were to hold. Suppose the economy's output was simply one composite commodity, produced by one homogeneous type of labor, and suppose all firms in the economy were identical, so that if we could describe the behavior of one of them we could describe the behavior of all. Suppose also that there were no costs at all to be encountered when the money price of this economy's output — which would, of course, be its general price level — was changed.

In such an economy, the only thing relevant to price- or wage-setting decisions would be the expectations about the behavior of the general price level of those who were implementing them. It would be transparently obvious to any one price-setter, whose behavior would, of course, be completely representative in this respect, that the price level would depend on the supply of money and the private sector's demand for it. The latter would be known about at once simply by dint of the representative price-setter's inspecting his own behavior in this regard, and so it would remain only to predict the behavior of the supply of money. Suppose then, that the economy's central bank obligingly announced what this was to be, and that the announcement was credible. The price-setter's problem would then be solved. And if, in such an absurd economy, the central bank announced that the stance of monetary policy — which had previously been compatible with an inflation rate of, say, 5 percent per annum — would hitherto be changed so as to create zero inflation, the representative price-setter, and therefore all price-setters, would immediately stop raising the price of output at five percent per annum and begin to hold it steady. Zero inflation would be achieved immediately and costlessly.

An economy such as this is a hopeless oversimplification of reality, but that is precisely the point. Both Howitt and Purvis emphasize that, in the Canadian economy, individual price-setters are concerned with getting the price of specific products and types of labor service right, and that these are far from homogeneous. Even if price-setters understand that the conduct of monetary policy is one factor that impinges on the demand for their product and on the price they can afford to pay for labor, it does not follow that they are able clearly to isolate its effects from all the market-specific information of which they have to take account. That being the case, and even if they are always free to act on new information as and when they receive it, it does not follow that they will be able to calculate an appropriate quantitative price reaction to even a credible announcement of the adoption of a zero-inflation monetary policy. The most that one might reasonably expect is that they will be less willing to raise prices by quite as much as they were before the announcement's receipt.

Even this conclusion begs two important questions. Why, in the real world, should we expect the Bank of Canada's policy announcements to be completely credible? And why should we expect price-setters to be free to respond immediately to new information? Monetary policy is, after all, the outcome of a political process, and political decisions are malleable.[6] If this was not the case, we would not be debating the desirability of zero inflation as a policy target. We would simply have accepted it by now, and would all be acting in the certainty that the Bank would see its plans through. Furthermore, if the price- and wage-setting process is costly, it will, as Howitt has explained, be implemented at intervals in the case of any specific enterprise, either because formal contractual relationships are involved, as is typically the case with wage agreements, or because it is simply too costly to be advising customers continuously of new price schedules. In short, all of the complications that must be added to our oversimplified model to bring it closer to reality give us extra reasons to believe that prices will not respond immediately and completely to an announced change in policy toward inflation.

The sluggishness of price- and wage-setting policies in response to policy changes that characterizes any actual economy has serious consequences for attempts to reduce inflation. When such attempts are made, their initial impact is to produce the type of liquidity problems described earlier, and the reduced expenditure that they induce has its first impact not on prices but on the volume of sales. The latter drop, and inventories begin to accumulate. In an open economy such as Canada, there is a further important complication, as Purvis points out. The exchange rate is a price much more ready to vary than those of industrial output, and higher interest rates associated with a liquidity shortage attract foreign capital inflows. These drive the value of the domestic currency up in a manner that is all too familiar to Canadians.[7] Thus, falling demand has a particularly marked impact on exporting and import-competing sectors of the economy. The upshot of all this is that output and employment contraction, rather than a lower rate of price increase, is the inevitable, and most visible, first-round effect of policies to bring down inflation.

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[6] The question of policy credibility has recently generated a large academic literature, ably surveyed by Keith Blackburn and Michael Christensen, "Monetary Policy and Policy Credibility," *Journal of Economic Literature* 27 (March 1989).

[7] The analysis of exchange-rate "overshooting," as it is termed, was developed by Rudiger Dornbusch, "Expectations and Exchange Rate Dynamics," *Journal of Political Economy* 84 (December 1976).

These consequences of monetary policy, including the tendency of the exchange rate to overappreciate, are temporary, but, as both Howitt and Purvis stress, that does not mean they are trivial. Their ultimate effect is to put downward pressure on the time path of prices and money wages, as individual firms seek to maintain and recover their markets, and unions seek to protect and indeed improve their members' employment prospects. As the inflation rate falls, so too do interest rates, and excessive upward pressure is removed from the exchange rate as well. Eventually, if policy is persevered with, its effects on output and employment probably disappear and the economy is left with a permanently lower inflation rate. How long is eventually? Purvis's best estimate, based on a careful perusal of empirical studies of the Canadian economy, is about five years, and there is no reason to second guess that rather pessimistic estimate.

Two points need to be made here. First, though the period of depressed output and employment that accompanies a reduction in the inflation rate is temporary, the output that is lost while it persists is lost forever. Moreover, to the extent that it is lost in the investment sector as well as in consumption, the economy's future productive capacity is lower than it otherwise might be. It may be an oversimplification, therefore, to apply that well-worn platitude "short-term pain for long-term gain" to the tradeoffs involved in reducing inflation. As Howitt's analysis of this issue makes quite clear, because the "pain" in question involves lost output that is, to repeat, lost forever — some of which might have been devoted to investment — some of it should be counted as a permanent cost of reducing inflation that must be taken account of in deciding whether it is worthwhile to do so.

It was stressed earlier that there is no reason to believe the economy's "natural" unemployment rate to be some immutable constant, determined forever by its inherent structure. On the contrary, the rate is malleable and, as Howitt points out, economists working on these matters are beginning to suspect that one factor affecting it is the economy's own past history of employment fluctuations. The reason why such "hysteresis" effects, as they are called, might arise is easily grasped.[8]

As we have already noted, an economy that has been depressed might have undertaken less investment than one that has been operating near full employment, and so its capital stock might be relatively old and badly adapted to the current structure of demand. More surely, its labor force will contain a relatively larger fraction of workers who have experienced unemployment and have therefore either failed to acquire work-related skills or have seen them eroded, and its average worker will be less employable. All of these effects will tend to create a higher long-term unemployment level. The persistence of high unemployment throughout the 1930s after the severe shock of 1929–33, the similar, though less serious, experience of the 1980s after the deep downturn of 1981–82, not to mention the high employment of the 1950s and 1960s that followed the enormous positive shock administered to the economy by World War II, may all be cited to support the view that such effects can be important. And to these possibilities one must add that a labor force with a history of high unemployment is likely to be less productive even if employment is restored to previous levels, so that the full magnitude of hysteresis effects cannot be assessed simply by inspecting the unemployment rate.

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[8] Discussions of hysteresis effects originate with the work of Edmund Phelps, *Inflation Policy and Unemployment Theory* (New York: W.W. Norton, 1972).

Implications for Current Canadian Policy

Any decision on the desirability of pursuing zero inflation — which, as we should explicitly remind ourselves at this point, realistically involves trying to establish and then to hold the rate of increase of the CPI within a 0 to 2 percent range rather than a 4 to 6 percent range, as it has been in recent years — involves a tradeoff. There are definite benefits to be realized from zero inflation; most (though not all) economists would agree with that. But just as surely, there are costs to be incurred in moving to that goal. These may be temporary, in the sense discussed above, but, if there is anything to the hysteresis argument, some of them might persist and accumulate well beyond a five-year horizon. If a choice is to be made, then quantification of the costs and benefits involved must be attempted. Howitt does just that, and concludes that the balance of advantages probably lies with going for inflation reduction.

The reader who is interested in the detailed arguments by which Howitt reaches this conclusion should look again at his essay. Suffice it here to highlight some of the judgments involved in making the broad case.

First, it hinges crucially on hysteresis effects being rather small, and this judgment seems more likely to be accurate if the policy in question is carried out rather slowly. The informal evidence cited earlier all comes from times following the economy's experiencing a large and sudden shock. Before the 1981–82 recession, there were a number of downturns in the wake of which unemployment did not seem to settle at a new, higher permanent rate whose persistence could not be explained by other factors.

Second, though Howitt does not rely to any undue extent on optimistic estimates of credibility effects, it remains true that the more credible is the Bank of Canada's policy the more rapidly are firms likely to respond to it in their price setting, and the fewer incentives will they need from depressed sales and output to move in the right direction. If fears about hysteresis suggest that policy contracted too rapidly and unexpectedly in 1981–82 for the economy's long-term good, hopes stemming from credibility effects would seem to require a rather tougher stance on the Bank's part than it took during the period of "gradualism" in the late 1970s.

Furthermore, the choice has been presented as involving remaining with the current inflation rate or bringing it down. There are two good reasons for believing that this is not quite the right way to state it.

First, it is far from clear what stance those who currently argue in favor of settling for inflation at current rates would take, were it to creep back up into the 6 or 7 percent range; nor indeed is it clear how high inflation would have to go before they changed their position of settling for the status quo. It may just be that the real choice at this juncture is not between zero inflation and 5 percent, but between price stability and inflation in some range whose minimum value is 5 percent. This possibility considerably increases the attraction of a zero-inflation goal.

Second, one must remember that zero inflation is not a policy goal that the Bank of Canada is considering pursuing in the future. Rather, it has already been pursuing it for the past 18 months, and no matter what it does from now on, the real effects of past policy have been and are going to be felt over the next year or two. Some costs of attaining zero inflation have already been paid, and others will be in the next 18 months, even if the goal is now abandoned. It is therefore quite possible to have argued 18 months ago — though I did not do so — that zero inflation was too expensive to be worth pursuing, but to argue now that it is worth persevering with the policy currently in place.

Concluding Comment

The implications of all the arguments set out in this book may be summarized very simply. Inflation — as measured by the Consumer Price Index — that fluctuates within a range of 0 to 2 percent per annum is about as precise as one can get in giving meaning to the phrase "zero inflation." It is possible for the Bank of Canada to conduct monetary policy so as to keep inflation within this range. The economy would perform better against this background than if inflation were maintained within its recent 4 to 6 percent bounds. It is costly to attain this lower inflation rate, but provided the economy is moved toward it rather slowly — over the next two to three years, for example — and particularly if one recalls that nothing can now be done to forestall the economy's slowing down in the immediate future, the costs in question are probably outweighed by the benefits to be attained. The Bank of Canada therefore deserves support.

Bibliography

Preface
and
The Political Economy of Inflation Control,
by Richard G. Lipsey

Courchene, Thomas J. *The Strategy of Gradualism: An Analysis of Bank of Canada Policy from Mid-1975 to Mid-1977*. Montreal: C.D. Howe Research Institute, 1977.

Crow, John W. "Some Responsibilities and Concerns of the Bank of Canada." Address by the Governor of the Bank of Canada at the annual meeting of the Canadian Economics Association, University of Windsor, Windsor, Ont., June 4, 1988. Reprinted in *Bank of Canada Review*, June 1988.

———. "The Work of Canadian Monetary Policy." Eric J. Hanson Memorial Lecture delivered at the University of Alberta, Edmonton, Alberta, January 18, 1988. Reprinted in *Bank of Canada Review*, February 1988.

Howitt, Peter. *Monetary Policy in Transition: A Study of Bank of Canada Policy, 1982–85*, Policy Study 1. Toronto: C.D. Howe Institute, 1986.

Lipsey, Richard G. "Does Money Always Depreciate?" *Lloyds Bank Review* 58 (October 1960).

Purvis, Douglas D. "Monetarism in Review." *Canadian Journal of Economics* 13 (February 1980).

The Bank of Canada and the Pursuit of Price Stability,
by Douglas D. Purvis

Bruce, Neil, and Douglas D. Purvis. "Consequences of Government Deficits." In *Fiscal and Monetary Policy*, Royal Commission on the Economic Union and Development Prospects for Canada Collected Research Studies 21, edited by John Sargent. Toronto: University of Toronto Press, 1985.

———. "Implementing a Prudent Fiscal Strategy Over the Medium Term." In *Policy Forum on Macropolicy Issues in the Medium Term*, edited by Jack M. Mintz and Douglas D. Purvis. Kingston, Ont.: John Deutsch Institute for the Study of Economic Policy, 1989.

Courchene, Thomas J. *No Place to Stand? Abandoning Monetary Targets: An Evaluation.* Toronto: C.D. Howe Institute, 1983.

Crow, John W. "The Work of Canadian Monetary Policy." Eric J. Hanson Memorial Lecture delivered at the University of Alberta, Edmonton, Alberta, January 18, 1988. Reprinted in *Bank of Canada Review*, February 1988.

Fleming, J.M. "Domestic Financial Policies under Fixed and under Floating Exchange Rates," *International Monetary Fund Staff Papers* 9 (1962).

Fortin, Pierre. "Improving Canadian Macropolicy: The Lessons of Thatcher, Greenspan, and McDougall." Paper presented to the Moneco-Econtro Conference, Kingston, Ont., August 30, 1989.

Freedman, Charles. "Monetary Policy in the 1990s — Lessons and Challenges." Paper presented to the Economic Policy Symposium hosted by the Federal Reserve Bank of Kansas City, Kansas City, Missouri, 1989.

Krugman, Paul. *Exchange Rate Instability*, the 1988 Robbins Lectures. Cambridge, Mass.: MIT Press, 1989.

Lucas, R.F. "The Bank of Canada and Zero Inflation: A New Cross of Gold?" *Canadian Public Policy* 15 (March 1989).

Mundell, R.A. "Capital Mobility and Stabilization Policy under Fixed and Flexible Exchange Rates," *Canadian Journal of Economics and Political Science* 29 (1963).

Zero Inflation as a Long-Term Target for Monetary Policy,

by Peter Howitt

Bailey, Martin J. "The Welfare Cost of Inflationary Finance," *Journal of Political Economy* 64 (1956): 93–110.

Blanchard, Olivier J., and Lawrence H. Summers. "Hysteresis and the European Unemployment Problem." In *NBER Macroeconomics*

Annual 1986, edited by Stanley Fischer. Cambridge, Mass.: MIT Press, 1986.

Boadway, Robin, Neil Bruce, and Jack Mintz. "Taxation, Inflation, and the Effective Marginal Tax Rate in Canada," *Canadian Journal of Economics* 17 (February 1984): 62–79.

Boothe, Paul M., and Stephen S. Poloz. "Unstable Money Demand and the Monetary Model of the Exchange Rate," *Canadian Journal of Economics* 21 (November 1988): 785–798.

Bossons, John. "The Effect of Inflation on Effective Corporate-Level Tax Rates on New Investment: Inter-Industry and Inter-Firm Variability." University of Toronto, Department of Economics, unpublished, 1983.

Campbell, John, and Gregory Mankiw. "Are Output Fluctuations Transitory?" *Quarterly Journal of Economics* 102 (November 1987): 857–880.

Cecchetti, S. "The Frequency of Price Adjustment: A Study of the News Stand Prices of Magazines, 1953 to 1979," *Journal of Econometrics* 31 (1986): 255–274.

Christophides, Louis N., and David A. Wilton. "The Determinants of Contract Length," *Journal of Monetary Economics* 13 (August 1983): 309–319.

Diamond, Peter A. "Aggregate Demand Management in Search Equilibrium," *Journal of Political Economy* 90 (1982): 881–899.

———, and James Mirlees. "Optimum Taxation and Public Production," *American Economic Review* 61 (March, June 1971): 8–27, 261–278.

Drazen, Alan. "The Optimal Rate of Inflation Revisited," *Journal of Monetary Economics* 5 (1979): 231–248.

Faig, Miguel. "Optimal Taxation of Money Balances." Stanford University, Department of Economics, unpublished, 1985.

Fisher, Irving. "Appreciation and Interest," *Publications of the American Economic Association*, third series, II (August 1896): 331–442.

Fischer, Stanley. "Monetary Policy and Performance in the U.S., Japan and Europe, 1973–86." In *Toward a World of Economic Stability: Optimal Monetary Framework and Policy*, edited by Yoshio Suzuki and M. Okabe. Tokyo: University of Tokyo Press, 1988.

———. "Money and the Production Function," *Economic Inquiry* 12 (December 1974): 517–533.

———. "Toward an Understanding of the Costs of Inflation: II." In *The Costs and Consequences of Inflation*, Carnegie-Rochester Conference Series on Public Policy 15, edited by Karl Brunner and Allan Meltzer (1981). Reprinted in his *Indexing, Inflation, and Economic Policy*. Cambridge, Mass.: MIT Press, 1987.

Fortin, Bernard, and André Bernier. "The Welfare Cost of Unemployment in Quebec: Harberger's Triangle Meets Okun's Gap." *Canadian Journal of Economics* 21 (February 1988): 161–181.

Fortin, Pierre. "Credit Crunches and Wage Dynamics: A Revision of the Canadian Phillips Curve, 1957–1987." Paper presented to the Third Annual Conference of the Canadian Macro Study Group, Queen's University, Kingston, Ont., November 1989.

Fried, Joel, and Peter Howitt. "The Effects of Inflation on Real Interest Rates." *American Economic Review* 73 (December 1983): 968–980.

Friedman, Milton. *The Optimum Quantity of Money and Other Essays*. Chicago: Aldine, 1969.

———. "The Role of Monetary Policy." *American Economic Review* 59 (March 1968): 1–17.

Howitt, Peter. "Indexation and the Adjustment to Inflation in Canada." In *Postwar Macroeconomic Developments*, Royal Commission on the Economic Union and Development Prospects for Canada Research Studies 20, John Sargent, Research Coordinator. Toronto: University of Toronto Press, 1986.

———. "Money and the Timing of Transactions in Intermediated Exchange." In *Finance Constraints, Expectations, and Macroeconomics*, edited by Meir Kohn and S.C. Tsiang. Oxford: Clarendon Press, 1988.

Jarrett, Peter, and Jack Selody. "The Productivity-Nexus in Canada, 1963–79." *Review of Economics and Statistics* 64 (August 1982): 361–367.

Kohn, Meir. "In Defense of the Finance Constraint." *Economic Inquiry* 19 (1981): 177–195.

Konieczny, Jerzy. "Inflation and Costly Price Adjustment." Unpublished Ph.D. dissertation, University of Western Ontario, London, Ont., 1987.

Laidler, David. "The Welfare Costs of Inflation in Neoclassical Theory — Some Unsettled Questions." In *Inflation Theory and Anti-Inflation Policy*, edited by E. Lundberg. London: Macmillan, 1978.

Leach, Jack. "Inflation as a Commodity Tax." *Canadian Journal of Economics* 16 (August 1983): 508–516.

Leijonhufrud, Axel. "Costs and Consequences of Inflation." In *The Microeconomic Foundations of Macroeconomics*, edited by G.C. Harcourt. London: Macmillan, 1977.

Lindbeck, Assar, and Dennis Snower. *The Insider-Outsider Theory of Employment and Unemployment.* Cambridge, Mass.: MIT Press, 1988.

Lucas, Robert E. "On the Mechanics of Economic Development," *Journal of Monetary Economics* 22 (January 1988): 3–42.

Mortenson, Dale. "Job Search and Labor Market Analysis." In *Handbook of Labor Economics*, vol. 2, edited by O.C. Ashenfelter and R. Layard. Amsterdam: North-Holland, 1986.

Mundell, Robert. "Inflation and Real Interest," *Journal of Political Economy* 71 (1963): 280–283.

Parkin, Michael. "The Output Inflation Trade-Off When Prices Are Costly to Change," *Journal of Political Economy* 94 (1986): 200–224.

Parks, R.W. "Inflation and Relative Price Variability," *Journal of Political Economy* 86 (1978): 79–96.

Phelps, Edmund S. "Inflation in the Theory of Public Finance," *Swedish Journal of Economics* 75 (1973): 67–82.

———. "Phillips Curves, Expectations of Inflation and Optimal Unemployment over Time," *Economica* 34 (August 1967): 254–281.

Prescott, E. "Efficiency of the Natural Rate," *Journal of Political Economy* 83 (December 1975): 1229–1236.

Riddell, Craig, and Philip Smith. "Expected Inflation and Wage Changes in Canada," *Canadian Journal of Economics* 15 (August 1982): 377–394.

Romer, Paul. "Increasing Returns and Long Run Growth," *Journal of Political Economy* 94 (1986): 1002–1037.

Rousseau, Henri-Paul. "The Dome Syndrome: The Debt Overhanging Canadian Government and Business," *Canadian Public Policy* 9 (March 1983): 37–52.

Sargent, Thomas J. "The Ends of Four Big Inflations." In *Inflation: Causes and Effects*, edited by Robert E. Hall. Chicago: University of Chicago Press, 1982.

Sheshinski, Eytan, and Yoram Weiss. "Inflation and Costs of Price Adjustments," *Review of Economic Studies* 44 (1977): 287–304.

Tobin, James. "Money and Economic Growth," *Econometrica* 33 (October 1965): 671–684.

Wagner, Helmut. "Alternatives of Disinflation and Stability Policy — Costs, Efficiency and Implementability: A Comparison between Japan and West Germany," *Bank of Japan Monetary and Economic Studies* 7 (April 1989): 41–97.

Wallis, John J., and Douglass C. North. "Measuring the Transaction Sector in the American Economy, 1870–1970." In *Long-Term Factors in American Economic Growth*, edited by Stanley Engerman and Robert Gallman. Chicago: University of Chicago Press, 1986.

Do We Measure Inflation Correctly?

by Pierre Fortin

Baldwin, Andrew. "Quality Adjustment in the Consumer Price Index." Statistics Canada, Ottawa, unpublished, October 1984.

Blinder, Alan S. "The Consumer Price Index and the Measurement of Recent Inflation," *Brookings Papers on Economic Activity* (2:1980): 544–547.

Cozier, Barry. "Real Wages in Canada: An Analysis of Recent Trends," *Bank of Canada Review*, November 1989, pp. 3–17.

Diewert, W. Erwin. "Index Numbers." In *The New Palgrave: A Dictionary of Economics*, vol. 2, edited by J. Eatwell, M. Milgate, and P. Newman. London: Macmillan, 1987.

———. "A Note on the Neglect of New Goods Bias." University of British Columbia, Vancouver, B.C., unpublished, September 1985.

———. "The Theory of the Cost-of-Living Index and the Measurement of Welfare Change." In *Price Level Measurement: Proceedings from a Conference Sponsored by Statistics Canada*, edited by W.E. Diewert and C. Montmarquette. Ottawa: Supply and Services Canada, 1983.

Fisher, Irving. *The Purchasing Power of Money*. New York: Macmillan, 1913.

Ford, Robert. "Measuring Inflation." Bank of Canada, Ottawa, unpublished, September 1988.

Généreux, Pierre A. "Impact of the Choice of Formulae on the Canadian Consumer Price Index." In *Price Level Measurement: Proceedings from a Conference Sponsored by Statistics Canada*, edited by W.E. Diewert and C. Montmarquette. Ottawa: Supply and Services Canada, 1983.

Manser, Marilyn E., and Richard J. McDonald. "An Analysis of Substitution Bias in Measuring Inflation, 1959–85," *Econometrica* 56 (July 1988): 909–930.

Randolph, William C. "Housing Depreciation and Aging Bias in the Consumer Price Index," *Journal of Economic and Business Statistics* 6 (July 1988): 359–371.

Statistics Canada. *Construction Price Statistics*, Cat. no. 62-007, Monthly.

———. *The Consumer Price Index*, Cat. no. 62-001, Monthly.

———. *The Consumer Price Index Reference Paper*, Cat. no. 62-553, Occasional.

———. *Consumer Prices and Price Indexes*, Cat. no. 62-010, Quarterly.

———. *Family Expenditure in Canada*, Cat. no. 62-555, Occasional.

———. *National Income and Expenditure Accounts, the Annual Estimates*, Cat. No. 13-201, Annual.

Triplett, Jack E. "The Measurement of Inflation: A Survey of Research on the Accuracy of Price Indexes." In *Analysis of Inflation*, edited by P.H. Earl. Lexington, Mass.: Lexington Books, 1975.

———. "Quality Bias in Price Indexes and New Methods of Quality Measurement." In *Price Indexes and Quality Change: Studies in New Methods of Measurement*, edited by Z. Griliches. Cambridge, Mass.: Harvard University Press, 1971.

The Zero-Inflation Target: An Overview of the Economic Issues,

by David Laidler

Blackburn, Keith, and Michael Christensen. "Monetary Policy and Policy Credibility," *Journal of Economic Literature* 27 (March 1989).

Cagan, Philip. "The Monetary Dynamics of Hyper-inflation." In *Studies in the Quantity Theory of Money*, edited by Milton Friedman. Chicago: University of Chicago Press, 1956.

Dornbusch, Rudiger. "Expectations and Exchange Rate Dynamics," *Journal of Political Economy* 84 (December 1976).

Eckstein, Otto. *Core Inflation*. Englewood Cliffs, N.J.: Prentice-Hall, 1981.

Laidler, David. *Taking Money Seriously*. Oxford: Philip Allan; Cambridge, Mass.: MIT Press, 1990.

———, and Michael Parkin. "Inflation — A Survey," *Economic Journal* 85 (September 1975).

Lucas, R.F. "A Zero Inflation Target," *Canadian Public Policy* 15 (March 1989).

Phelps, Edmund. *Inflation Policy and Unemployment Theory*. New York: W.W. Norton, 1972.

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Zero
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Dr. Richard G. Lipsey, the editor of this study, is Professor of Economics, Simon Fraser University, and a Fellow of the Canadian Institute for Advanced Research. He has also held academic positions at the London School of Economics, the University of Essex, and Queen's University in Kingston. From 1983 to 1989, he was Senior Economic Advisor to the C.D. Howe Institute. Dr. Lipsey is the author of several widely used economics textbooks, and is a frequent commentator on Canadian economic policy issues.